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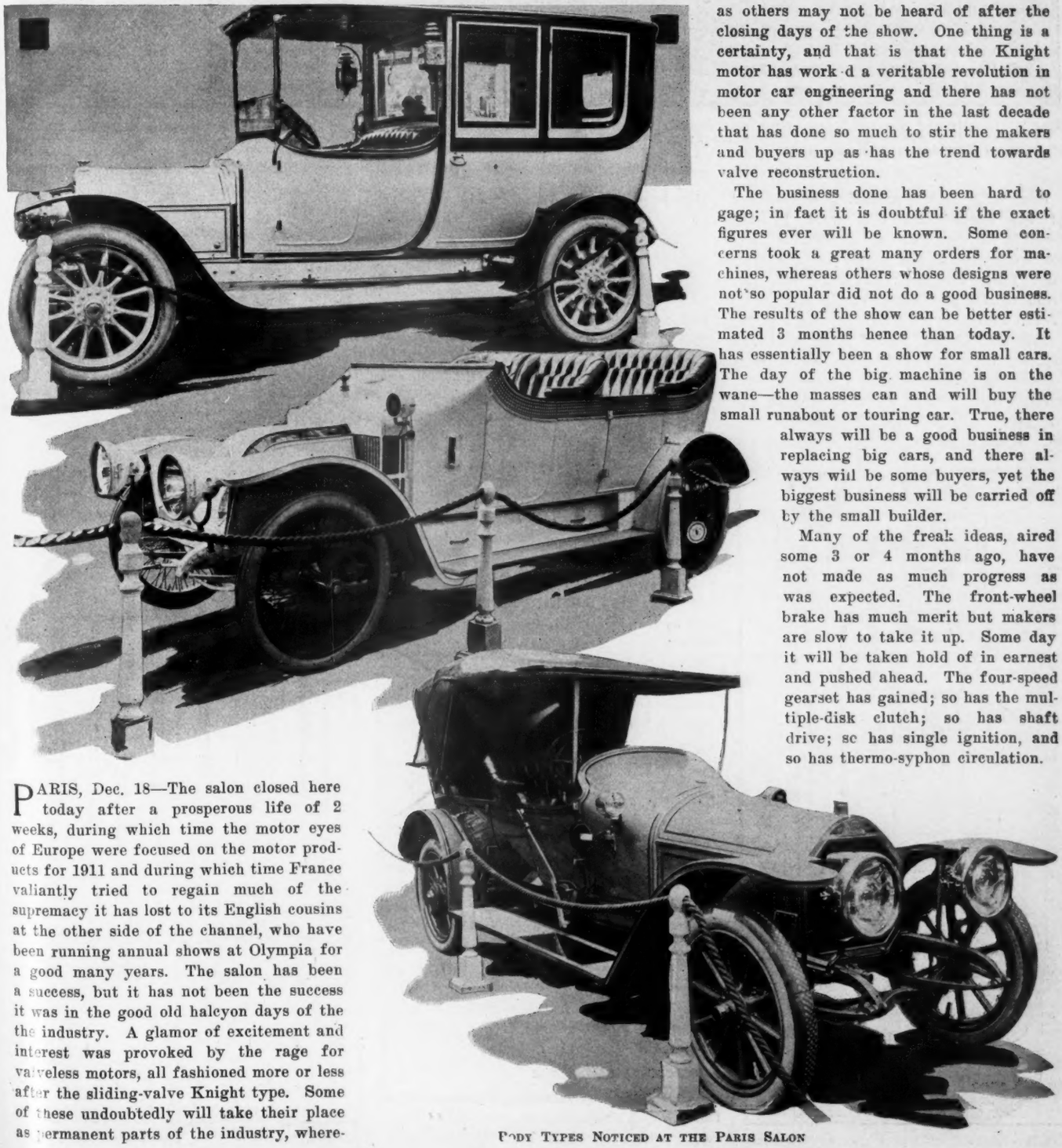
MOTOR AGE

PARIS SALON PROVES EDUCATIONAL FACTOR

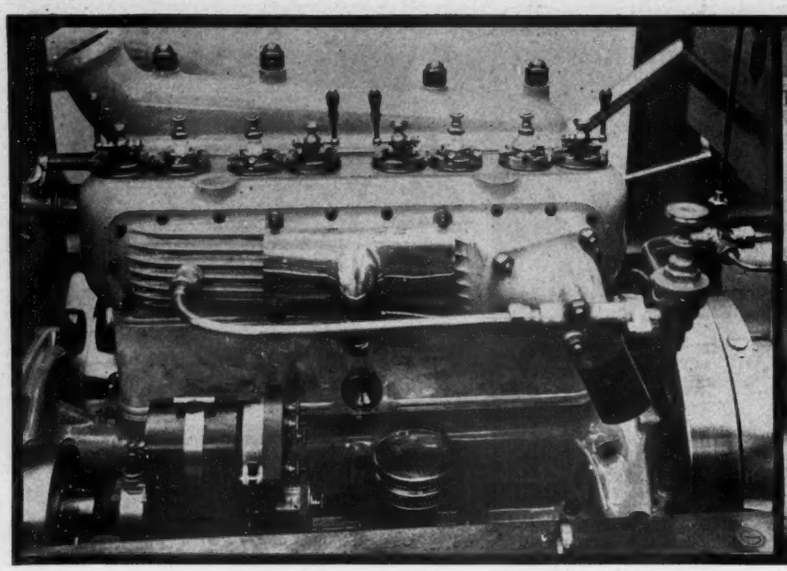


Body Types Noticed at the Paris Salon

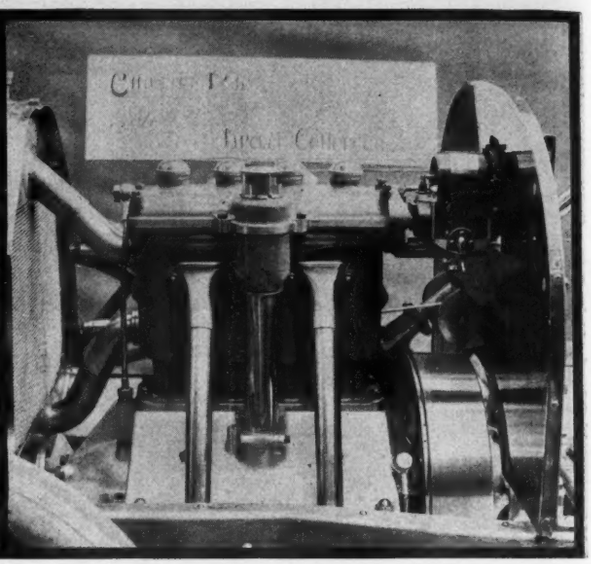
PARIS, Dec. 18—The salon closed here today after a prosperous life of 2 weeks, during which time the motor eyes of Europe were focused on the motor products for 1911 and during which time France valiantly tried to regain much of the supremacy it has lost to its English cousins at the other side of the channel, who have been running annual shows at Olympia for a good many years. The salon has been a success, but it has not been the success it was in the good old halcyon days of the the industry. A glamor of excitement and interest was provoked by the rage for valveless motors, all fashioned more or less after the sliding-valve Knight type. Some of these undoubtedly will take their place as permanent parts of the industry, where-as others may not be heard of after the closing days of the show. One thing is a certainty, and that is that the Knight motor has work d a veritable revolution in motor car engineering and there has not been any other factor in the last decade that has done so much to stir the makers and buyers up as has the trend towards valve reconstruction.

The business done has been hard to gage; in fact it is doubtful if the exact figures ever will be known. Some concerns took a great many orders for machines, whereas others whose designs were not so popular did not do a good business. The results of the show can be better estimated 3 months hence than today. It has essentially been a show for small cars. The day of the big machine is on the wane—the masses can and will buy the small runabout or touring car. True, there always will be a good business in replacing big cars, and there always will be some buyers, yet the biggest business will be carried off by the small builder.

Many of the freak ideas, aired some 3 or 4 months ago, have not made as much progress as was expected. The front-wheel brake has much merit but makers are slow to take it up. Some day it will be taken hold of in earnest and pushed ahead. The four-speed gearset has gained; so has the multiple-disk clutch; so has shaft drive; so has single ignition, and so has thermo-syphon circulation.



THE 22-HORSEPOWER BERLIET MOTOR WITH CYLINDERS CAST IN ONE BLOCK AND WITH THE HOT AIR INTAKE ON THE OPPOSITE SIDE TO THE CARBURETER AND PASSING THROUGH THE WATERJACKET



THE 12-HORSEPOWER COTTEREAU VALVELESS MOTOR SHOWING THE UNIQUE MAGNETO LOCATION ON A LEVEL WITH THE CYLINDER HEADS. IN THIS POSITION IT IS DRIVEN FROM THE OVERHEAD CAMSHAFT

Something like a sensation was caused at the Paris salon this week by the forcible seizure of a slide-valve motor exposed on the stand of the Rolland-Pilain company. Armed with an order from the president of the civil court of the Seine, two officers of the law invaded the Rolland-Pilain stand and announced their intention of taking away a demonstration chassis with a sectioned cylinder, which, it was claimed, was an infringement of the Knight & Kilbourne patent. After some parleying the officers insisted on taking the motor only, under the protest of the Rolland-Pilain company.

The move had been made on the instigation of Knight & Kilbourne, holders of a patent for a sleeve-valve motor adopted in England by the Daimler company and in France by the Panhard company. Although the Rolland-Pilain only has one reciprocating sleeve in place of two on the Knight motor, it is claimed that it is none the less an infringement, and on the presentation of their case to the French courts an order for a seizure was immediately granted. Later the Rolland-Pilain company made an appeal, with the result that the motor was returned and placed in its original position on its stand.

This being the first occasion on which an exhibit has been forcibly removed from a stand, it has caused considerable excitement in trade circles. Last year at the aeronautical exhibition a descriptive seizure was made of a number of aeroplanes alleged to infringe the Wright patents, but in this case the seizure merely consisted in noting that the alleged infringements were present, no attempt being made to remove them.

Naturally, after such a move on the part of the holders of the Knight patent there will be court proceedings, Charles Y. Knight, on behalf of the Daimler company, bringing an action against the Rolland-Pilain company for infringement of patent, and this firm bringing a counter action for damages resulting from what it claims to be an illegal seizure. It would not be at all surprising to find that other European firms are singled out for attack on the part of the holders of the Knight patent, the Rolland-Pilain not being the only slide-valve motor offered to the public on this side of the water.

Americans at the Salon

The American motor industry was fairly well represented at the Paris salon, which has just been brought to a close in Paris. The Packard Motor Car Co. sent over two members of its staff, J. H. Knight and O. E. Hunt; the Hupmobile company had as its delegates Mr. Nelson and Mr. Baker; from the Pierce-Arrow factory came Mr. Patten and Mr. Thomas; the Hudson Motor Car Co. had present G. G. Behn; Charles Schmit represented the Champion Ignition Co., of Flint; C. F. Splitdorf was constantly in attendance at the Splitdorf stand, and E. Gruenwald, of the Moline company, spent a few days at the Paris show after a visit to Germany.

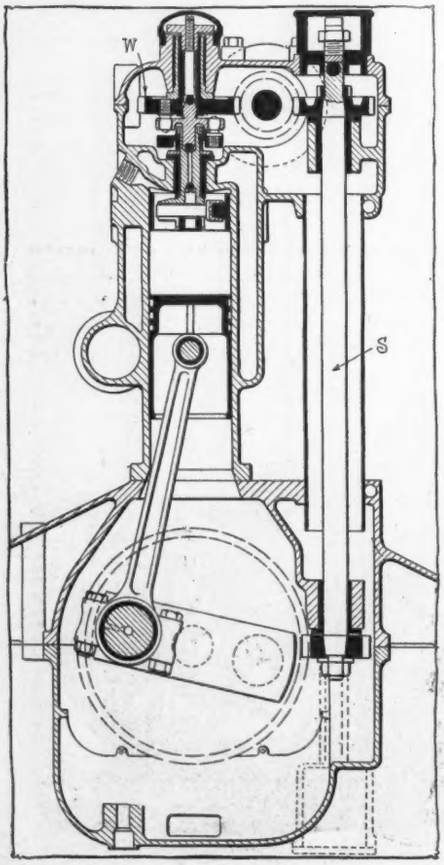


FIG. 1—SECTION OF THE COTTEREAU MOTOR

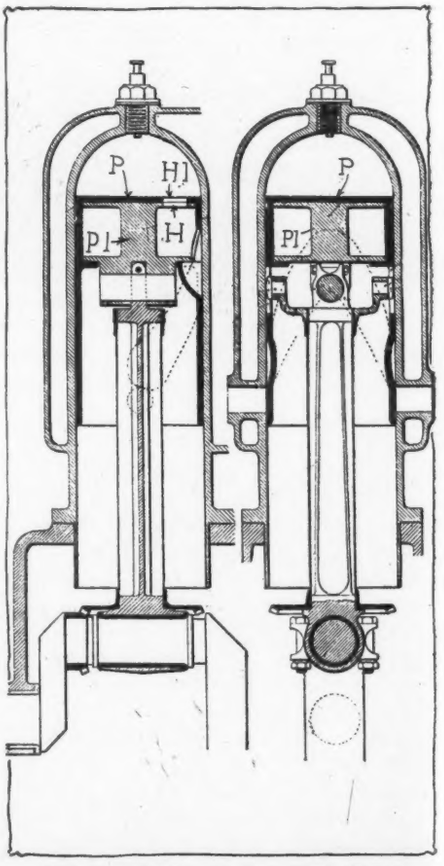


FIG. 2—SECTION OF THE BROC MOTOR

The only American firms taking part in the exhibition were Mitchell and Ford in the car class and Splitdorf in the ignition field. A number of American accessory houses were represented by their local agents, among them being Rushmore, Vacuum Oil Co., Klaxon, Sireno, Goodrich tires, etc.

Some Mechanical Features

Among the numerous rivals to the poppet valve now being placed on the European market is one produced by the Cottereau company, of Dijon, in which the admission and expulsion of the gases is obtained through a deep compression ring having a single port uncovering the intake and exhaust ports in the cylinder wall. As can be seen from Fig. 1, the ring R is about 1½ inch in depth, is split, and has a port P cut across its face and in the split portion. On the inner face is a stub S receiving the hollow transverse shaft passing through the hollow vertical spindle. In Fig. 3 the ring with its transverse shaft and vertical spindle S1 are seen mounted as employed in the motor.

The ring has a circular motion in the head of the cylinder—in other words, in the combustion chamber, the top of the ring being in contact with the head of the cylinder. The vertical spindle passes through the cylinder head, all possibility of leakage at this point being prevented by a bevel at the base of the spindle guide, and a corresponding bevel on the spindle. This latter is clearly shown on the cut of the ring. As there is a continuous rotary motion, a single attachment of the transverse shaft to the split ring is all that is necessary. Screwed onto the head of the spindle is a short transverse arm with a vertical stub received into a socket on a corresponding arm attached to a worm wheel W, Fig. 1, carried on a vertical shaft. The drive is thus taken from the crankshaft by means of a pair of bevel gears and enclosed vertical shaft S, Fig. 1, driving an overhead shaft on which four worm gears attack the four vertical spindles in the heads of the respective cylinders.

Oil Under Pressure

Lubrication is provided by supplying oil under pressure to an overhead oil bath lubricating the bevel and worm gearing, and flowing by gravity down the hollow spindles and through the hollow transverse shafts driving the rings to the walls of these latter. Although only just offered to the public, one of these motors has been under test for the past 12 months and has taken part in several hill-climbing competitions. The advantages claimed by the makers over the poppet-valve type are absolute silence of operation, larger valve area, and a better shape of combustion chamber. The motor is at present only made in a four-cylinder monobloc of 70 by 120 millimeters, 2.75 by 4.72 inches, bore and stroke.

In the Broc motor is found a double piston, the outer one P, Fig. 2, revolving

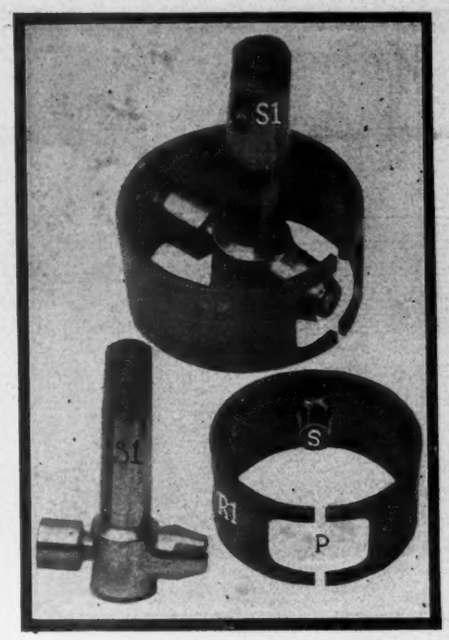


FIG. 3—THE ROTATING RING IN THE HEAD OF THE CYLINDER OF THE COTTEREAU VALVELESS MOTOR

by means of bevel gearing on the crankpin, and the inner one P1 being connected to the crankpin and driving the crankshaft in the ordinary way. In the head of the inner, or fixed piston, there are two holes on illustration at H, one for the intake and the other for the exhaust. In the head of the outer revolving piston there is a single hole H 1 uncovering the others. In the wall of the outer piston is a helicoidal groove G, Fig. 4, by means of which the charge is led from the carbureter to the intake port in the piston head and through there into the combustion chamber. An independent mounting prevents any of the force of the explosion being transmitted to the bevel gearing, these only having a rotary strain.

The design has the advantage of assuring a perfectly hemispheric combustion chamber and of reducing intake piping on the motor to a minimum.

SOLIDIFIED GASOLINE IS HERE

London, Dec. 17—The news of solidified gasoline has created considerable interest during the last month, many car users being interested specially in the reduced space in which solidified gasoline, as compared with liquid gasoline, can be carried. When solidified, the gasoline is put up in small cubes. A block or cube of solidified gasoline, when burning either on a hot pipe or in the ordinary way, does not cause liquefaction of the mass, the heat simply causing the vapor to be given off slowly and this vapor being immediately consumed.

In speaking of the manufacture of solidified gasoline in the Autocar, R. W. A. Brewer, who was commissioned to make a special investigation into this new form of gasoline, reports that he observed the transition of the fuel into solid form, but was not permitted to know any of the proportions existing among the ingredients.

A quantity of liquid was poured into a jacketed pan fitted with a lid, and the temperature of the liquid was gradually raised to —° centigrade. During this time —— grammes of stearine, which had been previously treated by hydrochloric acid was added in the form of powder. The quantity represented —% by weight of the total weight of liquid petrol. This stearine so treated dissolved readily in the gasoline.

A solution of alcohol equal to —% by weight, namely, — grammes, was then prepared and the method of preparation was as follows:

For every — grammes of methylated alcohol, — grammes of caustic soda was dissolved in a small quantity of water, the usual reactions taking place. The caustic soda solution was then added to the methyl-

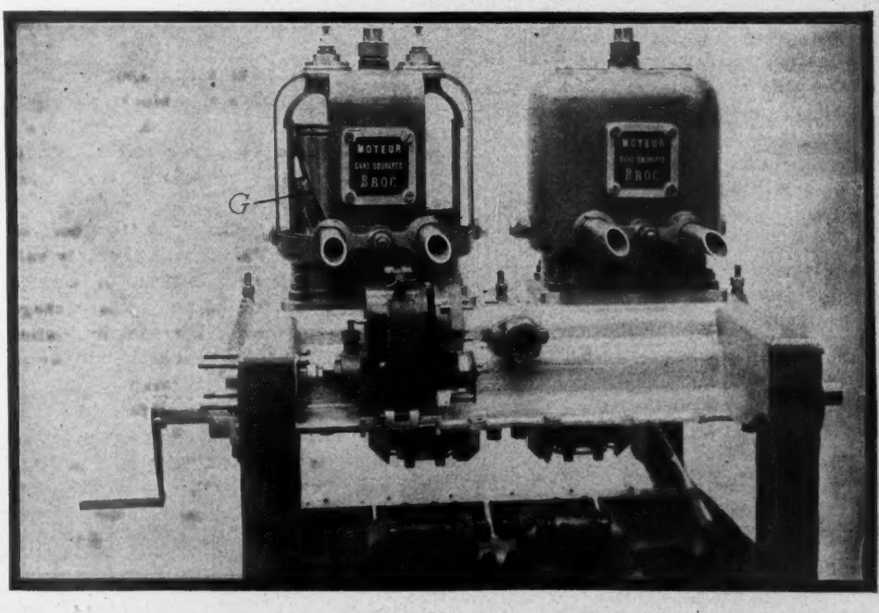
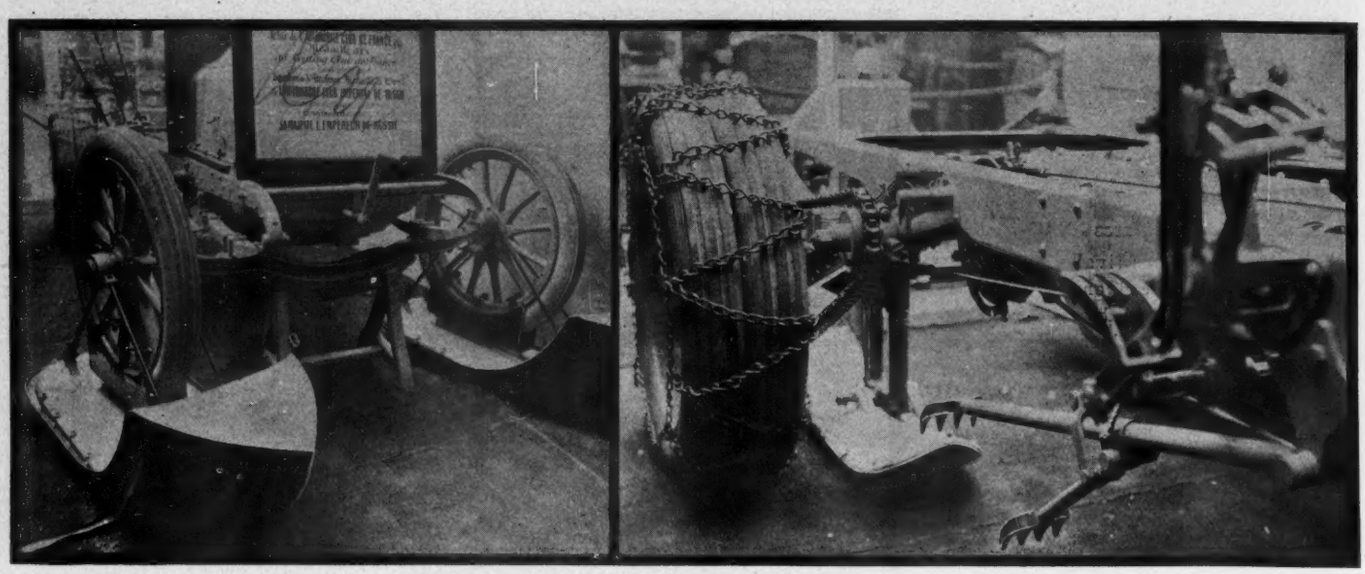


FIG. 4—ON THE BROC MOTOR THERE ARE TWO PISTONS IN EACH CYLINDER, ONE OF WHICH RECIPROCATES AND THE OTHER WITHIN IT REVOLVES



LORRAINE-DIETRICH TRUCK EXHIBITED IN PARIS SALON AND DESIGNED FOR WORK IN RUSSIA. THE TWO FRONT WHEELS REST ON BROAD RUNNERS OR SLEDS TO KEEP THEM FROM SINKING TOO DEEP INTO THE SNOW. THE REAR DUAL TREADS CARRY ANTI-SKID CHAINS AND INSIDE OF THE WHEELS ARE EMERGENCY RUNNERS TO KEEP THE WHEELS FROM SINKING TOO DEEP INTO THE LOOSE SNOW IN THE WINTER SEASON

ated alcohol, the color of the mixture becoming brown as the soda solution was dissolved in the alcohol. This color finally turned pink, and the mixture was then heated up to —° centigrade and the alcohol solution slowly poured into the gasoline and stearine solution.

A violent reaction then took place, and a large number of bubbles formed, but the temperature of the mixture did not rise. After the addition of about — grammes of water solidification of the mixture at once commenced.

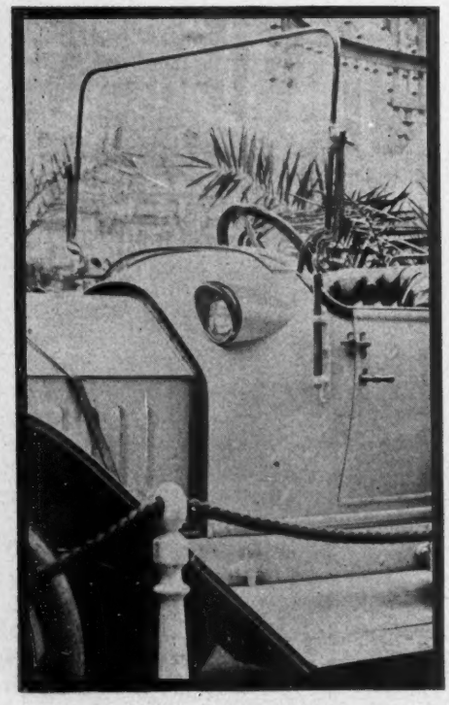
The gasoline thus treated was then ladled out into wooden boxes provided, whose dimensions were approximately 18 mm. cube, and it was noticed at once that the volume of the solidified gasoline was some 20 per cent less than that of the liquid gasoline from which it was formed. The final volume of the original quantity of 18.81 litres only occupied 14.55 litres in the solid form, which gives a calculated specific gravity for the mass of 0.935.

The physical properties of the solidified gasoline then received my attention, and I made a number of tests as follows:

First—With regard to the specific gravity. Two samples were taken from different parts of the mass, the first one being 29 cubic centimetres and weighing 27.2 grammes, giving a calculated specific gravity of 0 937, whilst another sample which appeared to be fully saturated with liquid gave a specific gravity of 0.810, and it was particularly noticed that the specific gravity throughout the mass was variable, as the mass itself was not all homogeneous, its nature varying with external prevailing conditions.

During the tests the evaporation from the exposed surface of a block of fuel was not very rapid, owing to the smallness of its surface to volume ratio. As an instance, a cube of 27 grammes weight only lost, 44.8 per cent of the original weight during exposure to the air in the laboratory for 3¼ hours. This is a particularly valuable feature from the point of view of safety, as fuel can be put up in packages which do not require hermetically sealing, if they are not to be kept for a lengthy period. Furthermore, the small quantity of vapor given off from the surface of a block of fuel does not cause such dangerous accumulations as is the case when liquid gasoline is exposed, and although this vapor be ignited, the flame is easily blown out or smothered, or can be extinguished with water.

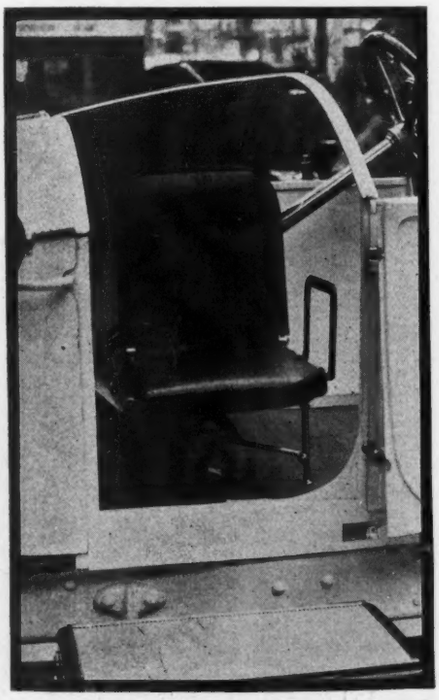
There are many claimed advantages for solidified gasoline. It is a much safer fuel to carry, which will have a direct result on railway and steamboat freight rates. The cost of solidification is small, being not more than $1 a ton of gasoline.



THE BIG LAMP ON THE DASH IS DOOMED TO GO, AND THIS ILLUSTRATION SHOWS THE 60-HORSEPOWER ISOTTA FITTED WITH THE SMALL ELECTRIC LAMP CARRIED INSIDE THE DASH AND WITH ONLY THE GLASS VISIBLE FROM THE FRONT

WANT INTERNATIONAL PASS

Paris, Dec. 19—After adopting international driving and car licenses, Europe is interested in obtaining an international type of triptyque for the use of car owners. At present each country draws up its own triptyque on lines which it considers best, with as many different varieties as there are countries concerned. With a view to simplification, it was decided by the meeting of the Recognized Automobile Clubs, held in Paris this week, that a spe-



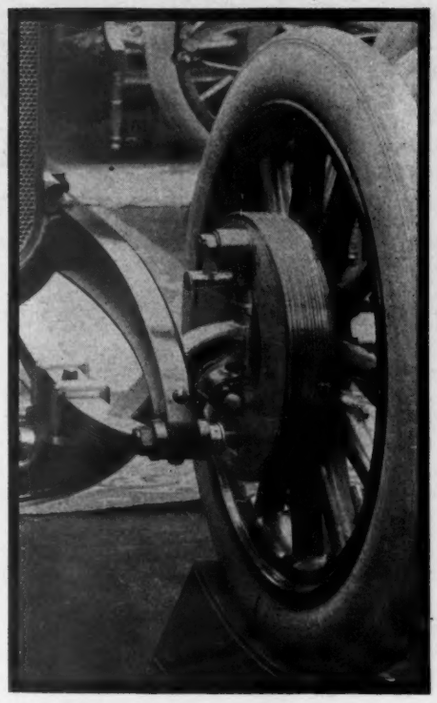
IN THE GOBRON RUNABOUT WITH HEAVY HOODED DASH AND TORPEDO BODY THE CHAUFFEUR'S SEAT IS SET INTO THE DASH AS ILLUSTRATED. THIS POSITION IS PREFERABLE TO THE RUNNING BOARD LOCATION AND LOOKS BETTER

cial committee should be appointed, with a delegate from each country interested, having for its object the creation of an international pass or a uniform type of triptyque. The committee will meet in Paris towards the end of January, probably remaining in session about 8 days.

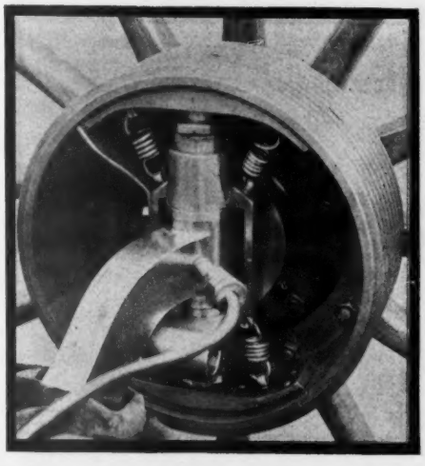
The simplification of customs formalities is now all that is necessary to make foreign touring as simple as traveling at home. With the international driving and car licenses a motorist can now pass through practically all the countries of Europe with one set of tags and one driving license, both delivered by his home country. This does not liberate him, however, from compliance with customs regulations, which must be gone through at every frontier station. The ideal aimed at by the international clubs is the creation of an international customs pass book, or if this is impossible as much simplification of the present triptyques as can be secured.

ROADS SHOULD BE MAINTAINED

Columbus, O., Dec. 26—The non-utility of road-building when not maintained afterwards was pointed out at a meeting of the board of trustees of the Ohio Good Roads Federation, which met in Columbus recently. It was argued that the trouble with the state aid law, under which many roads are improved in the state, has been that perpetual maintenance has not been a vital principle, and that roads built with state aid were allowed to go into decay, and also many roads selected for improvement were often remote and not accessible for general traffic. The board was pleased with the operations of the county road law enacted at the last session of the general assembly. It was stated that many counties in the state were eagerly taking advantage of this enactment, and it was considered a success. The board decided to again push the state aid road law, which failed of passage at the last session of the legislature.



THE FRONT-WHEEL BRAKES ON THE 1911 ISOTTA CAR



PNEUMATIC FRONT-WHEEL BRAKES ON ROLLAND PILAIN AT THE SHOW

Officers for the coming year were selected as follows: Archibald H. Huston, Columbus, president; C. S. Ashbrook, Mansfield; W. A. Alsdorf, Johnstown; Walter Braun, Columbus, vice-presidents; Jesse Taylor, Jamestown, secretary; Julius F. Stone, Columbus, treasurer. The legislative committee consists of Walter Braun, George W. Lattimer and W. A. Alsdorf.

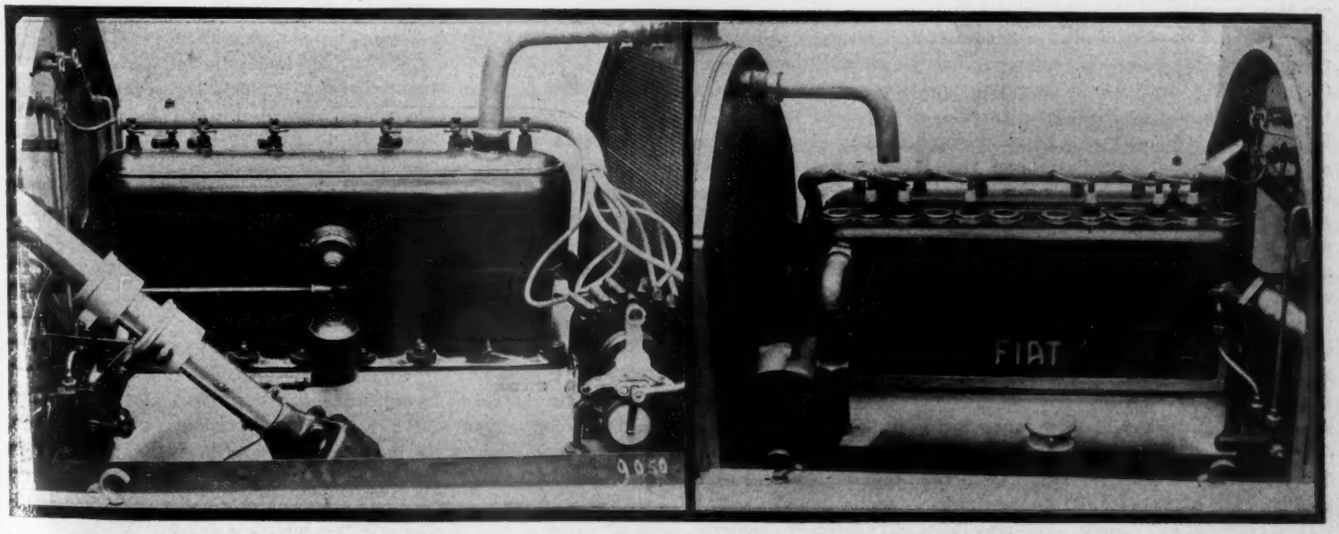
MILLIONAIRE WILL BUILD ROAD

Washington, D. C., Dec. 24—Washington motorists are greatly interested in the news that Frank J. Gould, the New York millionaire, has donated $100,000 for the construction of a highway between this city and Richmond, Va. The only proviso he makes is that the route is to be so arranged as to include Fredericksburg, Va. According to the announcement, Mr. Gould leaves the matter of selecting the route of the proposed highway to the motorists of Washington and Richmond.

President W. S. Duvall, of the Automobile Club of Washington, stated that as soon as the club received official notification of the Gould gift it will immediately appoint a survey committee to select the route, and after the work is completed will lay it before the financier. In addition the club, acting with the Automobile Club of Richmond, will form a finance committee to raise a portion of the total sum needed to build the highway.

"The idea of building a public highway between Washington and Richmond," said President Duvall, "will meet with the approval of all Washingtonians interested in good roads, as well as the great mass of motorists in the eastern part of the country. The club is prepared to join hands with the business men of the city in an effort to raise funds needed to complete the work that Mr. Gould's donation will inaugurate. A road of this kind has been one of the ancient needs of both Washington and Richmond."

Roughly estimated, the proposed road will be about 150 miles in length.



THESE TWO ILLUSTRATIONS SHOW THE NEW SIX-CYLINDER FIAT WITH ALL OF ITS CYLINDERS CAST IN ONE BLOCK. THE PUMP AND MAGNETO ARE CARRIED ON THE OPPOSITE ENDS OF A CROSS SHAFT AT THE FRONT OF THE MOTOR. A MERITORIOS CHARACTERISTIC IS THE SHORT MOTOR PIPES, THERE BEING NO INTAKE PIPE AT ALL AND THE WATER PIPES ARE EXCEEDINGLY SHORT. THE EXHAUST MANIFOLD IS CAST INTEGRALLY WITH THE CYLINDER BLOCK. THE VALVES ARE ON ONE SIDE

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A Retrospect of the Season

THIS has been a healthy season for the motor car business. To many it has looked a very unhealthy one; to many it has been unhealthy if unhealthy means a receivership; but frequently a receivership is a blessing in disguise. A year ago everybody talked overproduction, a stagnation of the market, a cut in prices, thousands of unsold cars on hand, capital and profits tied up in enlarged factories and no ready cash to weather the gale. Fortunately, not a few of the car makers had had experience in the bicycle industry in those years when these evils did abound. Fortunately, also, they plucked the grass to see which way the wind blew. The result is that this has been the best year for the industry since its inception. It has been a trying year for many companies. Some started out to build 3,500 cars. When some of the parts makers told them they could not fill orders, they went into hysterics and now they are praising those same parts makers because they could not supply parts for 1,600 cars, and now all of those 1,600 cars have been sold and the company is happy.

A YEAR ago some phases of the industry were far from healthy morally. Some parts makers contracted for their entire outputs early in the fall of 1909. After having sold their capacity other frantic buyers came along and offered them premiums on parts. They fell. They sold parts for a higher price which were honestly sold and deliveries promised to other concerns which had to wait and lost business thereby. Luckily, the punishment for this business dishonesty came—and came soon. Many of the late comers in the field who had offered 25 per cent advance on the normal price of parts found that the cars had to be sold, and when it came to selling it was more of a problem than they had anticipated. As a result the over-zealous parts maker looked for his money, which was not forthcoming, and he is still looking for it in some cases. It is well that such a business condition is over.

THIS has been a healthy year because it has been a year of growth. Growth is always healthy. By growth is meant that true growth, that development along every natural line and not a forced growth or development along one line. Up to this year too many of the makers have carried all of their eggs in one basket. With them it was all pleasure cars; they dreamed pleasure cars, made pleasure cars and thought pleasure cars. With them the suggestion to build a truck was a synonym of expense, a cutting of a profit melon to the other fellow. Why build trucks when there is more money in pleasure cars? It is true there was more money in building pleasure cars, but it is also true there was a chance of there being too many pleasure cars made so that prices might have to be cut or more money used in selling the machines. Some concerns have learned this; a good many of them have, and as a net result many trucks have been brought out this year, as well as numerous delivery wagons. This is very healthy—it is always healthy when a maker develops every possible ramification of the business so that if a stringency should develop along one line the stability in the other lines would carry him through a panic or a year or 2. It is to be hoped that the many makers will sanely develop the light delivery business, the medium and heavy truck business, and that the use of fire wagons for city fire departments will receive attention—in fact, that each factory will set aside a certain sum each year and organize a department to spend all of its time and these special funds in developing new avenues of car business. It would be much healthier to develop these along normal and rational lines than to follow one line until it is surfeited and then stampede to other lines. Stampeding is as dangerous in business as it was in the virgin days of the buffalo on the western plain, and that concern that hopes to live through a series of stampedes will find itself in the hands of the receiver sooner or later.

THE year 1910 has been a healthy one because it has shown to the world that certain concerns are weak when the real test is encountered and that they cannot live. An industry of 500 healthy houses is stronger than one of 1,000, half of which must sooner or later lapse into decay. The sooner the weak ones are eliminated the better. This is the fulfilment of a natural law. Naturalists, who follow very carefully the development of plant life, have observed as ages pass that one form of plant life gives way to another; and that those plants that are useful crowd out and eventually kill those that are less useful. This law of elimination is holding good in the business field of today, and it is bound to show itself in the motor car industry. The weak companies do not mean the small ones. A weak company is similar to the house founded on sand; there is something radically wrong in its makeup; its interior economy may be at fault; it may be costing it 25 per cent more to build cars than it does the other maker; or it may be that it is turning out inferior cars and selling them on the merits of the good car made by the rival factory. Whatever the unhealthy condition is, rest assured that it will exhibit itself, and also rest assured that that company, just as sure as the house built upon the sand, must fall. For the benefit of the industry and its eventual stability, it is better that many of such fall this year than a decade hence. Their fall now will be a warning to others, who may change their foundations.

NO industry can be a healthy one unless all of its branches are healthy. You cannot have a healthy organization with a healthy engineering department and an invalid factory organization; neither is the organization sound if the selling forces are incompetents. A healthy agency is generally an indication of a healthy factory. The factory must realize that the agency located in a city 2,000 miles away is a part of the organization. Many agencies have been invalids this year. They have shown exceptional weaknesses. It has been amazing what they have done, and if they continue their evil ways for another year they will not be in business by next Christmas. They cannot continue allowing $2,000 on a second-hand car that originally sold for $2,750. The selling organization must learn salesmanship, must adopt business methods, or they will prove the rotten branch that must be lopped off and a healthy one grafted on in its place. There are few agencies in the country in which any system is used. The good business of the last year or so has made money for them irrespective of system or any other phase of good business. A good business man is one who is a success in hard times, and these dull days are testing almost to the limit some of the poorly organized agencies.

ENGINEERS WILL DISCUSS MANY GOOD PAPERS

Program for Annual Meeting of Society in New York Announced—Late Trade Events

NEW YORK, Dec. 26—The complete program for the annual meeting of the Society of Automobile Engineers has been announced by Coker Clarksen. The engineers meet in the assembly hall of the Automobile Club of America, January 11 and 12, and will listen to the following:

Wednesday, 9 a. m., Business Session—Opening address by the president, H. E. Coffin; report of tellers of election of members; treasurer's report; annual report of the council; report of tellers of election of officers; discussion of proposed amendments to the society's constitution.

Wednesday, 2 p. m., Professional Session—Electro Steel. Paper by Joseph Schaeffers. Illustrations of Physical Facts Relating to Metallurgy. Address by Radclyffe Furness. Reports of Standards Committee. Introduction by Henry Souther, chairman. Iron and steel division, H. T. Lothrop. Aluminum and copper alloys division, W. H. Barr. Ball and roller bearings division, D. E. Graham. Broaches division, C. E. Davis. Gear metal constants division, G. W. Sargent. Carbureter division, G. G. Behn. Frame sections division, James H. Foster. Lock washers division, Frederick S. Sayre. Nomenclature division, A. L. McMeurtry. Seamless steel tubes division, H. W. Alden. Sheet metals division, H. E. Coffin. Springs division, A. C. Bergmann. Tire efficiency division, F. J. Newman. Miscellaneous division, Henry Souther.

3. Influence of multi-point ignition on output and efficiency of the internal combustion engine. Demonstration by Otto Heins on the dynamometer of the Automobile Club of America.

Wednesday, 6:30 p. m., Reception—Address by the retiring president and the president-elect. 7 p. m., society dinner, followed by entertainment provided by local committee.

Thursday, 9 a. m., Professional Session—The Construction of Highways for Motor Traffic. Address by Logan Waller Page, United States director of good roads, department of agriculture. Leaf Springs; Design and Methods of Mounting and of Treatment by the Manufacturer and the User. Paper by E. K. Rowland. Topic for discussion: Shock Absorbers. Novelties in Valve Systems. Paper by E. P. Batzell. Hot Rolled Gears. Paper by H. N. Anderson. Commercial Gasoline and the Impurities That Are Being Encountered. Paper by F. H. Floyd.

Thursday, 2 p. m., Professional Session—The Test of a 20-horse-power Franklin Air-cooled Motor. Conclusion of paper by L. R. Evans and R. P. Lay. Introduction by Professor R. C. Carpenter. Postponed from the last meeting of the society. Development of the Grinding Wheel. Paper by George N. Jeppson. Methods of Grinding. Paper by John C. Spence. Frictionless Friction Drive. Paper by Charles E. Duryea. The Fire Protection Question. Paper by N. B. Pope. Contest Rules That Affect the Engineer. Address by A. L. McMurtry, chairman of technical committee of American Automobile Association. Topic for discussion: The Engineering Lessons of the Motor Car Contest. Contest Timing and Coaching. Paper by Chester S. Ricker.

Thursday, 8 p. m., Professional Session, Commercial Vehicles—Papers: Report of standards committee division on wood wheel dimensions and fastenings for solid tires. Standardization possibilities in the commercial car field. W. P. Kennedy. Vertical Motors Under Foot-Boards versus Vertical Motors Under Hood. Introduction by B. D. Gray. Proper Power and Speed of Gasoline Motors for Truck Purposes, and Proper Road Speeds for Vehicles of Different Capacities. Introduction by P. H. Breed. Chain Drive for Trucks and Necessity of Housing Same. Type of Transmission for Trucks. Gasoline-Electric Transmission for Heavy Loads. Introduction by Alex. Churchward. Long-stroke versus Short-stroke Motors—Advantages and Disadvantages of Each. Paper by E. A. Myers. Foolproofing the Commercial Car Mechanism and Its Control. Paper by A. J. Slade. Tire Mileage and Costs. Co-operation between the Electric Vehicle Manufacturer and the Central Station. Address by Robert McA. Lloyd. Multiple Uses for Machines Designed for Municipal Service. The Ampere-hour Meter for Electric Vehicles Paper by R. C. Lanphier.

Additional Subjects—For Discussion if the Opportunity Affords: Drive-Shaft versus Rear-Wheel Brakes. Multiple-Disk Clutches. Three-Point versus Four-Point Suspension. Current Practices in Lubrication and Practical Results Obtained. Smoky Exhausts. Wheel Alignment, Camber and Foregather. Valve-Seat Angles. Cast-Iron Valves. T-Head versus L-Head versus Valve-in-the-Head Construction. Piston Ring Fitting and Piston Ring Friction. Proportioning Cooling Systems. Elimination of Noise in Motor Cars. Brake Materials and Surfaces. Six-Cylinder versus Four-Cylinder Motors of Equal Rating. Worm Drive. Lighting a Motor Car. Steering Gears. Tire Inflation.

RAMBLER DEALERS' REUNION

Chicago, Dec. 23—As a closing feature for the annual reunion of the Rambler salesmen Charles T. Jeffery, president of the Thomas B. Jeffery Co., last night entertained fifty salesmen and managers of branch agencies at a banquet and theater party. Manager Webb Jay, of the Chicago branch house, assisted President Jeffery in entertaining. The fifty guests assembled from all corners of the United States, representing the following metropolitan distributing and service centers for the Rambler car: Boston, New York, San Francisco, Milwaukee, Chicago, Dallas, Tex.; Omaha, Minneapolis, Cleveland, Los Angeles, Des Moines and Charlotte, N. C. Charles T. Jeffery gave the banquet at the La Salle hotel and then took the whole party to the Olympic theater.

The reunion commenced at Kenosha, Wis., where the fifty men that take such an active part in selling the output spent 4 days inspecting the Rambler factory. During these 4 days the mechanical features of the factory were studied closely by the party of fifty, who also spent several hours in exchanging views upon and discussing the best methods of dealing with the public and selling the Rambler cars. The serious work of the annual reunion was brought to a close at Kenosha yesterday, and the party of fifty came by train to Chicago to enjoy the hospitality of the president of the company. The entire session was one that was greatly enjoyed by all the Rambler agents.

CROXTON REORGANIZED

Massillon, O., Dec. 26—J. P. Stoltz, of New York, and H. D. Michaels have effected a reorganization of the Croxton-Keeton Motor Co., of Massillon, O., which has been in the hands of the courts since last summer. The name of the company has been changed to the Croxton Motor Co., capitalized at $250,000, of which $150,000 will be common and $100,000 7 per cent preferred stock. The new management took hold immediately. Production had not been stopped completely during the receivership, and all the new concern had to do was to put on more men. H. A. Croxton, founder of the company, will remain as president and general manager. Mr. Stoltz is vice-president and will have charge of the eastern distribution, with headquarters at New York. Mr. Michaels is secretary and treasurer of the reorganized company. The amount of cash involved in the transaction was $75,000, and a settlement with the creditors had been previously affected on a basis of 25 per cent.

The holders of the preferred issue of the Croxton-Keeton company will receive an equal number of similar shares in the new concern. The company has filed articles of incorporation at the Ohio capital. The incorporators, besides the three officers heretofore named, are W. E. N. Hemperley and Clarence P. L. McLain.

All idea of moving the factory from Massillon to some other location in Ohio has been abandoned, according to statements of officers, and it is more than probable the new company will stick here.

PARRY COMPANY AFFAIRS

Indianapolis, Ind., Dec. 28—The Union Trust Co., receiver for the Parry Automobile Co., after conferring with the creditors' committee, has asked the superior court to rescind the order permitting the issuance of $25,000 certificates to operate the plant and to make an order permitting the sale of property. An offer of $45,000, one-half cash, balance in 60 days, has been made. The receiver states that eighteen orders for cars have been canceled because prospective purchasers said it would be difficult to obtain duplicate parts. The receiver also says it is practically impossible to build up a selling organization for a company in the receiver's hands. A petition asking for an immediate sale will be heard tomorrow.

MAYTAG REORGANIZATION

Waterloo, Ia., Dec. 26—There has recently been a reorganization of the Maytag-Mason Motor Co., of Waterloo. Just recently the Maytag company has been incorporated for $1,000,000. Senator Maytag is president of the institution; B. B. Hunter, general manager, and Norman I. Taylor, sales and advertising manager. For 4 years the Maytag company has been contented to sell all the cars that could be manufactured in its plant in the four states of Iowa, Nebraska, Kansas and Minnesota. It is now about to reach out and has placed specifications for 2,500 cars for 1911. It made 1,000 in 1910. The Maytag company owns and controls its own body-making plant. The cars are built in the Maytag factory and not assembled. Special equipment has recently been installed in the Maytag plant that will allow the manufacture of nearly every part that goes into the construction of the Maytag cars.

Big Show Circuit is About to Start

NEW YORK, Dec. 27—All this week will be devoted to arranging the Grand Central palace for the independent show which will open there Saturday night and continue for a week. The combination of motoring and aviation is believed to be a winning one, the result of which, it is anticipated, will be a record-breaking crowd throughout the week.

Major-General Frederick Dent Grant, commander of the department of the east, U. S. A., with headquarters at Governor's Island, is to open the show in a speech in which he intends to comment upon the parts that the motor car and aeroplane take in modern military affairs, and what they may be expected to accomplish in the warfare of the future.

Military Splendor Promised

Following his address, General Grant, who will be accompanied by his aids in uniform, will be tendered a short reception on the main floor of the principal exhibition hall, when he will meet well-known motor car manufacturers and aviators. General Grant will be accompanied by Colonel Stephen C. Mills, General Staff, U. S. A.; Captain C. W. Fenton, Second Cavalry, and First Lieutenant Marion W. Howze, First Field Artillery.

More than 100 army officers and their families and about 150 naval officers are to be the guests of the management of the show on the same evening. Requisitions have been made in addition for 850 tickets by the Army and Navy Club, members of which are particularly interested in the aeroplane division and some of the new types of motor cars for field military use.

In addition to General Grant's address on the opening night there will be a special musical program by the Symphony orchestra, conducted by W. E. Blaufuss, of Chicago, which is to furnish two concerts daily throughout the week. Miss Jacobson, a well-known vocal soloist, will be one of a number of artists who will sing at the daily concerts.

Motor Car Exhibitors

Abbott Motor Co., American Motor Truck Co. of Michigan, Atterbury Motor Car Co., American Motor Truck Co., H. H. Babcock Co., L. J. Bergdoll Motor Car Co., C. S. Baeder, Lexington Motor Car Co., Car Makers Selling Co., Chase Motor Truck Co., Chicago Pneumatic Tool Co., Cortland Motor Wagon Co., Clarke-Carter Auto Co., Columbus Buggy Co., Demot Car Sales Co., Findlay Motor Co., Gramm Motor Car Co., Harry S. Houpt Mfg. Co., Imperial Auto Co., Johnson Service Co., Krit Motor Car Co., Lion Motor Car Co., Metz Co., Martin Carriage Works, Michigan Buggy Co., New Haven Truck and Auto Works, Albert L. Otto, Saurer truck, Owosso Motor Co., Parry Auto Co., W. A. Paterson Co., Pennsylvania Motor Car Co., Penn-Unit Car Co., J. M. Quimby & Co., Isotta, Roader Car Co., Scioto Auto Car Co., Spencer, Llaana Brener Co., Staver Carriage Co., Warren Motor Car Co., West Side Garage and Motor Co., Seitz motor, Whiting Motor Car Co., C. W. Kelsey Mfg. Co., Crawford Automobile Co., Coleman Motor Car Co., Cass Motor Truck Co., Victor Motor Truck Co., Otto Motor Car Co. of New York, Only Car Co., Alpena Motor Car Co., Henry Motor Car Sales Co., Correja Motor Car Co., Gaylord Motor Car Co., Otto F. Rost, Geneva Wagon Co., Richard B. Darre, De Tamble Motors Co., L. M. Hartman Sales Agency, J. M. Cunningham & Sons Co., Oliver Motor Car Co., Maytag-Mason Motor Co., Sage & Creighton, Velie Motor Vehicle Co., Colt-Stratton Co., Flanagan Motor Car Co., Beyster-Detroit Motor Car Co., McFarlan Motor Car Co., Paige-Detroit Auto Co., International Harvester Co. of America.

Garden Show Prospects

Announcement was made yesterday by the Association of Licensed Automobile Manufacturers that space has already been assigned to 286 different exhibitors for the part 2 period of the show. These concerns will have their displays in the show building from Monday, January 16, until Saturday, January 21. The part 1 period, from January 7 to 14, will be devoted exclusively to gasoline pleasure vehicles and accessories.

On the main floor there will be twenty-one different makes of gasoline and electric business or freight-carrying vehicles, and fourteen other makes are to be displayed in prominent spaces on the elevated platform. The elevated platform will also have sixty-nine exhibits of tires and accessories, forty-eight accessory exhibits will be located in the balcony, sixteen accessory exhibits will be shown in the concert hall, nine in the second tier and room 7, eighty-one will be located in the basement and twenty-eight exhibits of motorcycle accessories will be located in the balcony.

The gasoline trucks, to be shown on the main floor, will include the White, Morgan, Peerless, Pierce-Arrow, Packard, Knox, Stearns, Hewitt, Autocar, Reliance, Rapid, Alden-Sampson, Grabowsky, Mack and Alco. The electric pleasure and business machines will include the Waverley, Hupp-Yeats, Studebaker, General Vehicle, Detroit and Lansden. The freight-carrying vehicles, to be shown on the elevated platform, are all gasoline machines and include the following: Buick, Franklin, Cartercar, Reo, Pope-Hartford, Brush, Overland, Randolph, Kisselkar, Atlas, Ward, McIntyre, Garford and Mercedes.

The exhibitors of passenger cars will begin moving their machines out of the garden at 11 o'clock Saturday night, January 14, and the business vehicle show will be thrown open at 8 o'clock on Monday evening, January 16.

Representatives of the concerns that are to exhibit in the Importers' Automobile Salon held a meeting at the Hotel Astor and drew for the spaces they will use from January 2 to 7. Arrangements have been made for the use of an exclusive entrance to the salon from the Forty-fifth street side of the Astor, so show visitors will not have to go through the hotel to reach the big ballroom on the ground floor. The big open floor space in the ballroom will be divided by the wide main aisle into two sections of three spaces each. At the right of the entrance door, under a balcony, there will be three spaces and a reception room, and at the left side of the ballroom, under another balcony, there will be four more spaces.

In the section on the left side of the main aisle the C. G. V. Import Co. drew the space nearest the door, where C. G. V. and Zedel cars will be shown. The Panhard and Levassor Automobile Co. will have the next space for Panhard cars, and the De Dion-Bouton selling branch will display De Dion cars in the third space. The Renault Freres selling branch drew the first space in the section on the right side of the main aisle, where Renault cars will be shown. A. T. Demarest & Co. will show Itala and English Daimler cars in the next space, and the Benz Auto Import Co. of America will show Benz cars in the third space.

Cesare Conti drew the first space under the balcony, at the right of the entrance, to show S. P. A. cars. Henry Ducasse & Co. will use the next space to show Darracq cars. The Peugeot Import Co. will display Peugeot cars in the end space. Of the spaces at the left side of the room, under the balcony, Burr & Co. drew the one nearest the Broadway side of the building, where examples of fine coachwork will be shown. Next the S. P. O. Automobile Co. will show S. P. O. and Vinot cars. J. M. Quinby & Co. will have Isotta-Fraschini cars in the third space. Glentworth & Jackson drew the fourth space for Napier cars.

Garden Show Decorations

In the procession of vastly varied events which hold forth in New York's biggest show building, none has yet succeeded in effecting more complete transformations of the interior of Madison Square garden than the annual motor shows. While the task of accomplishing this in a new way becomes more difficult each year, the genius of the show managers seems to rise to the occasion. For the forthcoming affair, which for the first time in the history of the garden shows is to be an exhibition lasting 2 weeks, from January 7 to 21, a new precedent for decorative schemes has been worked out.

When it is said that more than $45,000 is being expended judiciously in preparing the setting for the exhibits only, a vague idea is conveyed of what is to be presented. The motor cars of America's representative makers will attract their usual following of the public, but apart from them the scenic surroundings will be worthy of a long trip to see. The show will be divided into two parts. Part 1, which will be held during the week of January 7 to 14, will be devoted exclusively to passenger or pleasure vehicles, while commercial vehicles, electric carriages and motor cycles will be shown during the part 2 period from January 16 to 21. Accessories and parts will be exhibited at both exhibitions.

Big gardens and little gardens, aerial gardens and underground gardens will make up the setting for the exhibits for the forthcoming show. The artist's sketch in colors of the decorative scheme, which now is displayed in the windows of deal-

ers along New York's row, reveals that a Roman terraced garden of dignified architectural design will constitute the decorative theme and serve as a background for the exhibits. There will be much less ornamentation than heretofore, with a consequent gain of spacious effect and out-of-door feeling. White and gold are to be the dominant colors, although green and crimson are to be strongly in evidence. The girders of the big dome will be screened by a canopy of soft material—rich azure blue in tone—amid which myriad incandescent lamps will twinkle. Several massive lamps of rustic construction will be pendant from the roof.

Other Features

The exhibition spaces of the main floor and elevated platform will be covered with a carpet of light green hue, which will add to the out-of-door effect. At brief intervals along the aisles of the exhibits of the arena and elevated platforms will be ornamental lamp-posts, finished in verd-bronze, which will inform the visitors of the names of the exhibitors and direct them to various departments of the show. The posts are 8 feet in height. Entering the arena from the foyer, the visitor will be confronted by a big pergola-fountain, in the form of a low abutment of gray stone, in front of which is carved a long seat for visitors. The fountain has a trough-like basin in which gold-fish will frolic amid natural and artificial water-plants, from the petals of which varicolored lights will radiate. The pergola is supported by eight white Doric columns and is topped with crossbeams covered with trailing wistaria.

Extending along both sides of the arena will be boxes which will seat about 1,200 people. Extending about the arena and towering up to the dome from the floor will be twenty-five big columns which support the elevated platforms and balconies. These are of structural steel, but are so cleverly disguised by lattice effects that they will appear as if made of ornate wood.

Gain in Space

By the use of the columns and the extensions of the platforms, 26,000 square feet of exhibiting space was gained this year. More than 200 tons of steel and 1,000,000 feet of lumber are to be used in reconstructing the interior of the garden for the show. Two monster freight elevators are to be installed to hoist the cars to the galleries. During the show their presence will not be noticeable, being concealed by decorative effects. A white balustrade will extend all along the outer edges of the balconies.

In the general view there will be three balconies in the rear and in the front of the interior and but two on either side. The foyer of the garden will be decorated as never before. The visitor will pass under a big Italian pergola of a treatment similar to that which is to be found in the exhibition hall.

Christmas Joy Abounds in Detroit

DETROIT, MICH., Dec. 24—It is a merry Christmas for the motor car interests of Detroit and vicinity. While the year 1910 has not been fully up to expectations and the output has fallen short of the estimates in some instances, there is still much reason to rejoice. Never has there been a more bountiful Yuletide. A large percentage of the earnings of the motor car workers and their employers has gone to enrich the coffers of local merchants, while the increased demand for sealskin coats and diamond necklaces bears witness to the fact that some fat dividend checks have been handed out.

There is great joy in the thriving little city of Flint, where gloom prevailed a few short months ago. Every department of the big Buick factory, on which a goodly portion of Flint's population depends for its livelihood, is humming with activity, and as rapidly as possible the plant is being brought up to its full working capacity under the direction of General Manager C. W. Nash. In the sales department, wonders are being accomplished by R. H. Collins, formerly in charge of the southwestern district, who assumed full charge of this department 6 weeks ago. The company claims that it has orders in hand for the entire output of 1911, estimated at 14,000 cars.

Magee General Motors' Auditor

Announcement is made that C. A. Magee, of St. Louis, has been appointed auditor of the General Motors Co. and will assume his new duties the first of the year. He has been identified with the Laclede Gas Light Co., of St. Louis, for some years as comptroller. Mr. Magee will have his headquarters in Detroit, where the general offices of the company are to be located.

Directors of the Lozier Motor Co., at the recent annual meeting, elected the following officers: President, Henry A. Lozier; vice-presidents, Gilbert W. Lee and Fred C. Chandler; treasurer, Charles H. Hodges; assistant treasurers, Samuel Regar and Henry H. Sanger; secretary, Cyrus E. Lothrop. Members of the executive committee were all re-elected, as follows: George G. Booth, Charles H. Hodges, Lewis H. Jones, Gilbert W. Lee, Cyrus E. Lothrop, Charles B. Warren and Henry A. Lozier, ex-officio.

Vernon C. Fry, whose purchase of the assets of the bankrupt Detroit-Dearborn Motor Car Co., as noted last week, announces that he will continue the business with the present facilities, turning out the same kind of cars that were manufactured by the old company. A new corporation will be organized at once, which will be headed by Mr. Fry as president. A company is in process of formation for the manufacture of a puncture-proof inner tube, invented by E. A. Marsh. The tube, on the tread side, is constructed of coils, which permit much greater elasticity than is the case with the ordinary tube.

Work is being pushed on the extensive plant of the Universal Motor Truck Co., which is being erected at the Grand Trunk railroad and Theodore street. It is hoped to have it ready for occupancy by January 15. The site comprises 3 acres. The main building will be 84 by 258 feet, four stories high and of reinforced concrete construction. It is being built on the flat-slab system, without beams or girders. The company is capitalized at $350,000 and is backed by some of Detroit's most prominent citizens.

Detroit's Flying Squadron

Police Commissioner Croul's flying squadron, inaugurated in the fall, is proving its efficiency in many ways and has become a terror to evil-doers. Yesterday morning two burglars were caught in the act of going through two of the city's fashionable homes. One of them has a bullet through the lug as a result of the battle.

The Auto Parts Co. has purchased the entire plant of Widman & Co., furniture manufacturers, occupying an entire block on the Grand Trunk railway, for $65,000, and has started moving in. The purchase greatly increases the company's facilities, making a total floor space of 60,000 instead of 20,000 square feet. Officers are: President, Alfred O. Dunk; secretary, Lewis A. Austin; treasurer, V. C. Anderson.

Claude S. Briggs, principal organizer and former president of the Krit Motor Car Co., has been appointed general manager of the Brush Runabout Co., assuming his new duties at once.

INDIANAPOLIS AGENCIES

Indianapolis, Ind., Dec. 26—There will be a number of agency changes for the 1911 season. Agencies for the coming season have been announced as follows:

Buick Motor Co., Buick; Cadillac Automobile Co. of Indiana, Cadillac; J. I. Case Threshing Machine Co., Case; United Motor Indianapolis Co., Maxwell, Columbia; Studebaker Brothers Co. of Indianapolis, E-M-F. and Flanders; Finch & Freeman, Auburn, De Tample, Richmond and Rider-Lewis; Sterling Motor Car Co., Firestone and Krit; Peck Motor Car Co., Great Western, Jackson and Halladay; Henderson Motor Sales Co., Cole and Westcott; Hearsey-Willis Co., Mitchell, White and Hupmobile; Inter-State Motor Sales Co., Inter-State and Winton; International Harvester Co., International; Conduitt Automobile Co., Knox; Gibson Automobile Co., Marion and Everitt; Nordyke & Marmon Co., factory sales branch, Marmon; McFarlan Six Sales Co., McFarlan six; National Motor Vehicle Co., factory sales branch, National; Fisher Automobile Co., Stoddard-Dayton, Overland and Empire; Archey-Atkins Co., Pierce-Arrow and Woods; Premier Sales Co., Premier; Ricketts and Diamond Co., R. A. C. six; Van Camp Hardware and Iron Co., Randolph; Indianapolis Motor Car Co., Rapid; Frank P. Fox Co., Pope-Hartford, Frayer-Miller and Rauch & Lang; Reo State Automobile Co., Reo; Speedwell Agency Co., Speedwell; Holcomb Motor Car Co., Waverley and Packard; Indiana Automobile Co., Chalmers, Hudson and Thomas; Smith Automobile Co., Parry; Samuel Davidson, Imperial and Whiting; Ford Motor Co., Ford; Paterson Motor Car Co., Paterson; Regal Motor Sales Co., Regal; C. F. Sheetes Livery Co., Lambert; Morton Place garage, Moline; Delaware garage, Chase; Oldsmobile Co. of Indianapolis, Oldsmobile; Avery Co., Avery and Glide; Indianapolis Automobile Co., Brush and Cartercar; Moon Motor Car Co., Moon and Davis; Maytag-Mason Co., Mason; Rambler Auto Co., Rambler; Oakland Motor Car Co., Oakland.

Los Angeles County, California, Is

LOS ANGELES, Cal., Dec. 24—Three millions of golden dollars is a large amount of money to be expended on highways at any time, and especially when it represents the investment of not an entire state, but of one comparatively small county. Such is the appropriation which is giving to the county of Los Angeles one of the most complete and splendid highway systems in the world.

For nearly 3 years the movement to secure the money to construct a series of improved roads throughout the county, towards the mountains on the west and north, and towards other coast cities along the Pacific, has been fostered by the motorists and the fruit-growers of that wealthy section. For nearly 2 years the actual work of construction has been under way and progress is being made at the rate of about ½ mile per day right now.

A large amount of preliminary work had to be done, so that the total of completed highway now open to the public is between 50 and 60 miles, and there are 100 miles of roadway upon which the efforts of the officials in charge are now being expended.

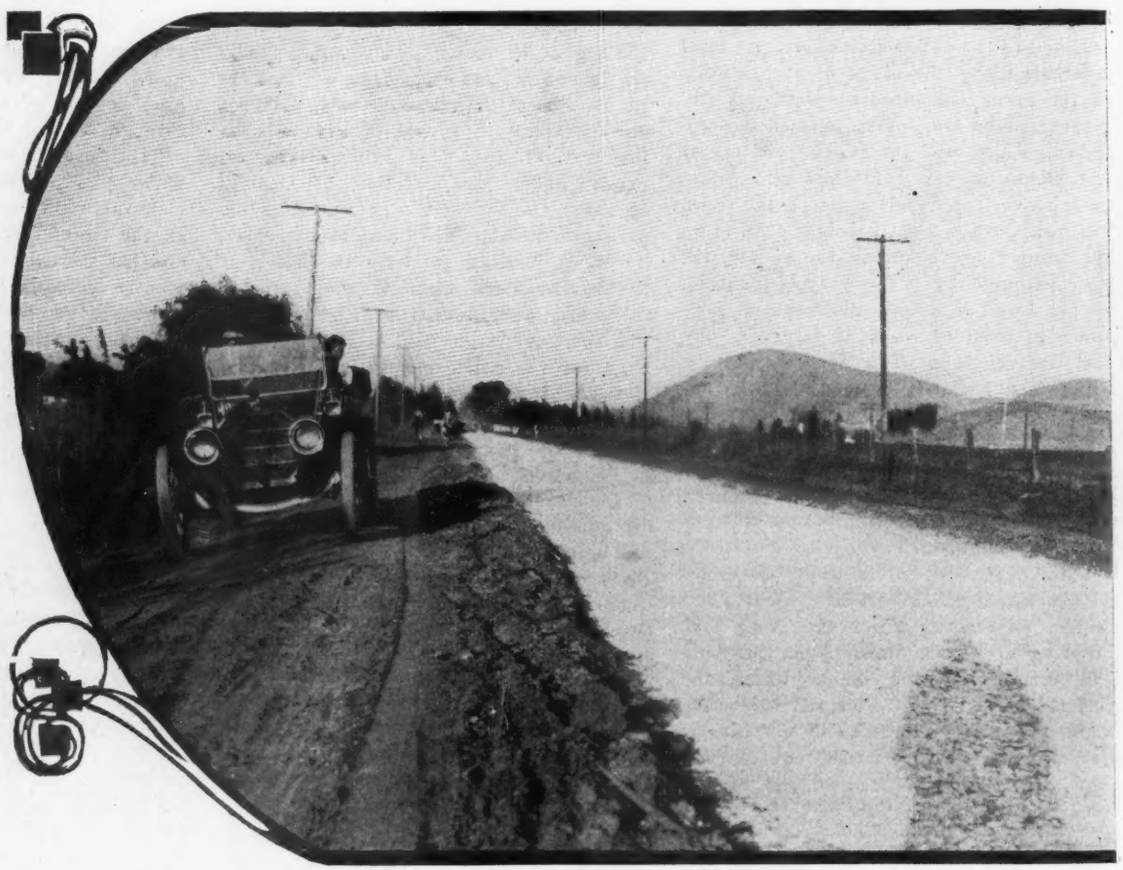
On March 19, 1907, a law was passed by the state legislature which created a highway commission for any county in the state, citing its powers and authority, and providing for the constructing, straightening, improving and repairing of the main public highways in any county; providing for the voting, issuing and selling of bonds, and authorizing cities and towns to improve the portions of those roads within their own corporate limits. The referendum was brought into effect in securing the large appropriation now being made in the various parts of the Golden State, for according to the law, the board of supervisors of any county upon receiving a petition signed by freeholder electors of the county, equal in number to at least 10 per cent of the gubernatorial vote, asking that the matter of issuing bonds for highway purposes be submitted to the electors of the county, may appoint a highway commission for the county.

This commission is to consist of three members, who are to investigate the main highways and ascertain which should be improved by the issuance of bonds, and to estimate the cost. The report upon the necessary improvements and the cost proposed to be covered by the bond issues forms the basis upon which the electors of the county may vote as to whether or not the bonds shall be issued—in fact, the highway law is one of the most liberal and at the same time the most exacting of any on record, because it is liberal in its comprehensiveness and exacting in its stipulations as to the quality of materials, size of roadbed, and authority to straighten, grade and construct drainage as may be deemed necessary.

Under this enactment a preliminary board was formed in Los Angeles county, consisting of George H. Bixby, of Long Beach; Martin C. Marsh, of Los Angeles, and C. D. Daggett. Their report was based upon an endeavor to have a system of trunk lines radiating from the center of Los Angeles to its several large and important suburbs and to the borders of other counties, wherein might be constructed extensions which would be of commercial value to the fruit-grower, the farmer and the motorist. The estimated cost of $3,500,000 was made for roads entirely within the county and eliminating all streets within the corporate limits. The bond issues were considered in the popular election, and the vote was for the expenditure of $3,000,000.

The permanent commission consists of Mr. Bixby and Mr. Marsh, and in addition Mr. Calvert, of Azusa, was appointed by the board of supervisors, with Mr. Bixby as chairman, and upon these three men has devolved the duty of carrying out the plans first laid down by the board, and the result will redound more and more to their credit.

The Los Angeles county highway commission has taken up this work with a fine regard for business-like dealing, and with the idea of making quality paramount to all other considerations. Under the direction of Engineer-in-Chief A. E. Loder, specifications have been issued for grading and construction of culverts, bridges and incidental structures, for the furnishing of asphaltic road oil, for the construction of oiled macadam pavements, and for the furnishing of broken stone and other materials, as provided in the state statutes, in order to give proper opportunity for bids from the contractors. Part of the actual work is being done by the county direct and part by contractors, but all under the constant supervision of the highway commission and the engineer and his staff. Two motor cars were purchased shortly after the commission was formed to facilitate their movements, and the commissioners state that the service which has been given by their Premier and



HIGHWAY NEARING COMPLETION IN LOS ANGELES COUNTY—INSPECTING PARTY IN PREMIER

Spending Millions For Good Roads

Locomobile touring cars has been of real value to them in expediting operations.

According to the original estimate, there were 307 miles of roads to be given attention, though it is likely that this may be reduced to 300 miles by cut-offs, more accurate surveys and reconstruction work, as is evident from later developments. A large amount of this distance has been, and will be, over established roads, which will need but little alteration, and part of it over new rights of way, some of the distance including trunk systems already improved. In all cases there are logical reasons for reconstruction, and at no time has there been a charge that the commission was concentrating efforts upon any roads which might perhaps be of lesser importance.

The first contract was let on April 28, 1909, to macadamize the El Monte road to the town of Alhambra, and since that time 50 or 60 miles of beautiful white macadam highways have been opened to the public. About 100 miles in addition are under construction and are receiving the active attention of the laboring gangs. The work has been progressing at the rate of about ½ mile per day, and the amount of finished work would be greater were it not for the necessity of doing a great amount of supplementary work such as provisions for drainage, the placing of culverts, rebuilding of bridges and distribution of materials.

A splendid type of cross section was early adopted, and macadam roadways are being made in accordance with the best accepted methods in the east and in Europe, using a trap rock with asphaltic binding compound. The county has two quarries, one at Pacoma and the other at San Dimas, the former operated by the county itself and producing 1,000 tons of crushed rock a day, and the latter being worked on a contract at a price of 53½ cents per ton.

The result of all this effort is a splendid highway which has a hard and solid surface, smooth and unyielding, and so graded as to shed water readily. The board of supervisors having the construction work well under way, is now considering plans for maintenance and these will mature within a very short time.

The center of the city of Los Angeles is about 12 miles from the ocean at its closest point and it averages from that to 20, and it is about 30 or 40 miles to the foothills along routes generally traversed by motorists. In this section there has been laid out a network of roads, including many that will undoubtedly come to be famous—the Foothills boulevard and the Los Angeles El Monte and Bomona road, the Long Beach boulevard, the Wilmington and San Pedro road, the Redondo road, the San Fernando road and the Orange county road. With the famous resorts at Santa Monica, Venice, Redondo and Long Beach, there is a large amount of traffic at all times of the year toward the ocean.

The San Fernando road stretches northwestward as far as Saugus, and will undoubtedly be a prominent feeder to Los Angeles county from all northern, upstate points. Several routes are offered to San Diego and points in a southern direction, such as the Orange county road to Downey and Norwalk, the Artesia road and through the Long Beach boulevard to the road via Naples. Toward San Bernardino there is also a choice of routes, there being the El Monte, the Pomona and the road through Alhambra and San Gabriel mission, another via Covina and the third is the beautiful Foothills boulevard through Pasadena, Arcadia, Monrovia, Azusa and Claremont.

Los Angeles County Improved Highway Running Through Eucalyptus Grove

The Los Angeles commissioners have been given to understand by the authorities of adjoining counties that they will receive co-operation in the establishment of trunk line systems, and it is interesting to note that one of the strongest movements to assist them in their endeavors was started by the arrival at Los Angeles of A. L. Westgard, of the Touring Club of America, and his party in their Premier car, completing the mapping of a transcontinental highway.

Expectations indicate that the expenditure of the $3,000,000 will be completed in about 2 years, or a little more, and when completed this progressive county at the southwestern corner of our nation will have a system of interconnected roadways which will be models of modern highway construction and will reduce the cost of transportation for the fruit-grower, increase the use of motor cars and the pleasures of motoring, and in all ways redound to the credit of those far-sighted authorities who realize that good roads are expensive, but that good roads will last. So well is the scheme working out that already the officials of Los Angeles country are in receipt of many inquiries as to how they are conducting their highway campaign.

Our Foreign

WASHINGTON, D. C., Dec. 24—Because of the requests made by manufacturers of American motor cars as to the outlook in Germany, the United States government has caused Consul Ralph Busser of Erfurt to make a detail report, which has been published in the Daily Consular and Trade Reports as follows:

At present the demand for self-propelled vehicles in Germany is almost entirely supplied by the home industry, which has made great progress during the past decade, gradually supplanting the French machines that formerly had the cream of the trade. The American manufacturers must realized that at present they are at a disadvantage in that fully a score of German firms which turn out good, serviceable cars at reasonable prices, have already established a reputation and trade in certain types of machines, are familiar with the conditions that have to be met to get business, advertise widely, and, in the case of large output, have in addition well-equipped stock rooms and selling agencies in many of the cities.

Cost of Invasion

The first question to be considered by the American manufacturers in connection with the export trade is whether the extent and trade possibilities of a particular foreign market are such as to warrant the expense of introducing their machines and gaining a foothold there. The class of people financially able to own motor cars is much more limited in Germany than in the United States. Here the people of substantial means are chiefly high government officials, the landed proprietors, capitalists, bankers, prosperous professional men, big merchants, manufacturers, and others who are proprietors of important business. Business managers and others working in a subordinate capacity are not, as a general rule, nearly so well paid as in the United States where high-salaried employes constitute a fair proportion of those who can afford motor cars. The use of motor cars by physicians is not near so much the custom here as in the United States. Outside of the great commercial centers there is absent that spirit of hustle so prevalent in most American cities, large and small. The people are conservative, and a motor car is ordinarily looked upon as a luxury which only the rich can afford.

In view of the considerations mentioned, the German market for touring or outing motor cars is restricted to a comparatively small class of people; and this trade has certainly not been neglected by the German motor car makers, who are progressive in the art of business getting as well as in manufacture. The demand for both high-grade and cheap machines seems to be fairly well supplied by the domestic industries. The growing popularity of motor cars and their increased use in a business way has created more demand for cheap than for high-grade machines. A cheap German make of the four-cylinder phaeton type, 12 to 14 horsepower, seating two persons, can be purchased here for about $900; seating four persons, $935. This car is upholstered in imitation leather, and the prices quoted do not include top cover, glass front piece, lamps, and minor attachments. A two-cylinder car of the same make, 6 to 7 horsepower, likewise upholstered, sells for about $625; and a one-cylinder, 5 to 6 horsepower, $400. Half-top cover, reserve accumulator and tires, lamps, etc., are extra. Steam and electric cars are seldom seen.

A type of American motor car which is seen occasionally in cities like Berlin and which is conspicuous by reason of the apparent lack of domestic rivals is the electric runabout. This stylish, safe, and convenient equipage is in a class by itself here, as no German cars are so well adapted for the use of women, for purposes of pleasure, shopping, or making calls. Appealing as such a car does to the fashionable city dwellers, and considering the ease with which it can be operated by a woman, American manufacturers by advertising and exhibiting their superb electric vehicles in the German cities have good prospects of cultivating an exclusive and profitable trade.

While America cannot teach Europe much in the construction of recreation cars, France having for a long time set the pace for the whole world in touring and racing motor cars, it is different with commercial vehicles other than taxicabs. Inventive genius and progressive business methods, together with the high cost of the labor of man and horse in the United States, have combined to lead a number of big American motor car firms to specialize in the construction of motor vehicles for commercial purposes. The foreign market for the latter is encouraging to those manufacturers who will follow methods that have brought success to American exporters of other mechanical appliances that save labor, facilitate business, and, above all, accomplish results in the simplest, most effective, and economical manner.

Outlook in Germany

In other words, the outlook for American motor car trade in Germany is more favorable when the motor vehicle is considered as an article not of luxury but of business utility. To be sure, motor taxicabs and omnibuses have for some time been a common feature of passenger transportation in the large German cities. Motor trucks also are considerably used for the delivery of beer and other heavy local freight. However, in the manufacture and use of self-propelled vehicles for light delivery service as well as for commercial purposes other than those mentioned, less progress has been made here than in the United States. With the same ingenuity and enterprise displayed in the construction of commercial vehicles as has served to give to other American labor and time-saving devices prestige in all parts of the world, the time appears to be ripe to push the export trade in serviceable types of power wagons built to meet business requirements in the territory exploited. The transition from horse to horseless vehicles is bound to take place in practically all branches of local transportation in the German cities and towns as merchants and other business men become convinced of the facilities and economies to be gained thereby. The rise in the price of fodder and other farm products is one of the important factors in the situation here as well as in the United States.

Tariff and Freight

The disadvantage of tariff and freight to which American exporters are subjected in competition with German manufacturers can perhaps be overcome, as it has in many other machinery lines, partly by lower cost of manufacture due to large scale production of standard patterns and partly by the general superiority of American mechanical construction and operation. While in Germany there are motor car plants manufacturing commercial as well as other motor vehicles, there is no large scale production as we see it in many of the American plants. The German firms with their comparatively small plants and limited equipment manufacture commercial motor vehicles only upon order, which of course means great delay and ordinarily much higher prices than where selling from stock is made possible by large scale production of standardized types. The greater capital, enterprise, thorough factory organization, and superior mechanical equipment of the leading American plants, and their capacity for turning out quickly standard machines for a great variety of business requirements, all make for moderate prices as well as simplicity, ingenuity, and efficiency in mechanical construction.

In comparing American with German motor vehicles, especially those for delivery service and other commercial purposes, the up-to-date type of the former is generally superior to the latter in the following respects: Less weight per unit of efficiency; more complete interchangeability of parts, including removable power plant, so that machine is easier to repair and keep in order; vehicle so constructed that the passenger body may be easily and quickly substituted for the delivery or freight body, thus enabling one machine to answer the purposes of two; greater accessibility of machinery

Relations

and mechanical parts; the simple mechanical construction of the typical American machine renders it easier for one who is not a mechanic to operate and keep the same in order, while the consequent reduction of labor and danger from accidents tends to increase sales among those who can not afford a chauffeur; greater ingenuity of construction and convenience of operation, and, in general, a more practical application of advanced mechanical ideas to meet the various requirements of merchants and other local carriers.

Strong Selling Organization Needed

Speaking generally about the marketing of American goods abroad, and without special reference to motor vehicles, it is unfortunate that so many American manufacturers who have plants capable of supplying a heavy foreign demand fail to establish abroad strong selling organizations similar to those that have enabled them to push their trade so successfully at home. It is difficult to understand why a manufacturer who has found systematic organization and liberal advertising so necessary for building up a profitable business in the United States will tackle the foreign market in the parsimonious and half-hearted manner that is frequently the case. The puny efforts exerted by many American firms to win trade in Germany are ridiculous in contrast with the energy and enterprise customarily displayed by them in competing for their share of the home market.

The sterotyped method is to write to the American consuls for lists of dealers and agents in their respective districts likely to be interested in the articles in question. The next step is to send catalogs, generally in English only, to listed dealers and agents, and to offer selling agencies, much of this work being done in an indiscriminate and haphazard manner. If the correspondence between the manufacturer and those with curiosity enough to respond to his communications ever reaches the stage of appointing agents for certain territory, the would-be exporter is usually satisfied to rest on his oars and wait for the agent to send in the orders. Perhaps in a year or so he wakes up to the fact that the anticipated business has failed to materialize, and then either gives up the experiment in disgust or again proceeds with the ineffectual plan of appointing agents and attempting to do business by correspondence and the absent treatment, the expenditure in thus handling the foreign trade being usually confined to the cost of postage and English-printed literature for German readers.

This mistaken policy must also be avoided by American manufacturers of motor vehicles if they wish to establish a profitable trade in this or any other foreign country. To those firms seriously prepared to enter this strongly competitive field, the writer offers the following pointers, which are based upon his own observations and talks with experts in Erfurt and other German cities:

German trade can not be secured by correspondence and literature or even by agents alone. Prospective buyers must see the machine in actual operation. Exhibition rooms and judicious advertising are as useful here as in the United States.

The manufacturer should send to Germany a first-class representative, one expert in the business and able to speak German fluently, for the purpose of studying the possibilities and peculiar requirements of the market, trade conditions, facilities for advertising, and methods of doing business. With his assistance an intelligent plan of campaign can be mapped out, central headquarters and local agencies established, and a strong selling organization formed to popularize and market the goods. No less thorough method can succeed where the motor vehicle to be introduced must meet the competition of similar kinds of domestic vehicles whose reputation in the market is already established.

Must Establish in Germany

According to the opinions of dealers and experts interviewed, an American manufacturer will not be in a position to compete on equal terms with the German factories unless he has, to a certain extent, physically domiciled his business undertaking in Germany. This does not mean the establishment of a factory or plant here, except in so far as may be necessary to assemble the machinery and parts if it be found more economical to ship in that way from the American factory. Whether or not, however, the vehicles are shipped knocked down or as finished cars, one or more workshops conveniently located are a necessary adjunct of the business in Germany. Aside from what assembling or overhauling may be required before selling or delivering a machine, the American manufacturer can best protect the reputation of his products by having here a repair plant and staff of expert mechanics thoroughly acquainted with the construction of the cars. If such facilities are lacking, the manufacturer's guaranty has little meaning to the prospective buyer. Furthermore, when for purposes of repair or alteration imported machines must be temporarily placed in unfamiliar, prejudiced, or unfriendly hands, the consequent delay, unsatisfactory repairs, or unfair comparison with competing machines may lead to a loss of confidence on the part of the owner of the American car. In this manner first-class machines may be easily discredited and the chances for future business in the locality seriously injured.

A large proportion of the German motor vehicles are sold direct from the factory, which has its own agencies and exclusive representatives in various localities. In case repairs are necessary the machine is generally sent to the factory. Therefore the prospective German customer can hardly be induced to invest in an American machine if the exporter has not provided within easy transportation distance a workshop and other facilities for the prompt repair thereof and replacement of defective, broken, or worn-out parts.

The second requirement in the domiciliation of the business is the establishment of supply and showrooms in the important cities where the business possibilities warrant such expenditure. The most elaborate catalogs and photographs will not alone suffice to sell motor vehicles here. The best advertisement is a permanent exhibition of the various types or models, and actual demonstration of their workmanship and operation.

How to Advertise

As to advertising propaganda, the American manufacturer needs very little advice, as in progressive ideas he is usually ahead of his foreign competitor. Therefore in this department of business getting he does not need to pattern after German methods, but should wherever feasible employ methods that have been successful elsewhere, the more original the better. In this connection, however, it must be said that the German periodicals, other than the daily newspapers, have much less value as advertising mediums than the popular magazines in the United States. The circulation of the German monthly and weekly periodicals is comparatively small, and they are not read so extensively by business men as corresponding American periodicals. Showrooms, active selling agencies, and attractively prepared catalogs are the essentials of a successful advertising campaign. American catalogs prepared at great expense are often wasted abroad through indiscriminate distribution. The advantage in marketing commercial motor vehicles is that one knows where to lay his hands upon possible customers. The field is a definite one. Therefore it would seem advisable to institute a follow-up system of circular letters to business firms that have wagons, trucks, or drays drawn by horses. In this way those interested could be ferreted out and, in many cases, induced to inspect catalogs and witness the operation of power wagons designed to meet the special requirements of their delivery or transportation service.

Preparation of Catalog

As to the preparation of catalogs for the German market, it is suggested that manufacturers should lay more stress upon

the economies to be effected by the substitution of the particular make of motor vehicle for horsepower. Minute technical description, while valuable to the engineer and machinist, is often unintelligible to the merchant or business man, even though the same be translated into German, which is often very difficult to do. Knowledge of mechanics and mechanical principles is not so widely diffused among laymen in Germany as in the United States. The principal feature of the typical German catalog is not an elaborate exposition of mechanical details, but the testimonials of those who have purchased and operated the machine advertised, describing its smooth, comfortable driving, freedom from defects and disarrangement, speed and endurance, ability to climb hills and overcome topographical difficulties and adverse weather conditions, economy in the use of fuel, inconsiderable repairs, and other goods points indicating its superiority over other machines with which the testifier may have had experience.

Use the German Law

If an American manufacturer proposes to establish in Germany a depot for receiving, assembling, and distribution, a chain of showrooms, stores, or selling agencies, and possibly one or more repair shops at convenient points, he may find it advisable to organize the German branch of his business under German laws. The German business of some well-known American mechanical specialties is conducted by limited liability companies organized under imperial laws.

The domestication, to this extent, of American business undertakings in Germany has been found advantageous from both a commercial and legal standpoint. There always is a certain amount of prejudice against imported goods, which is obviated, to a large extent, when the articles are marketed under their German name and by German companies. Furthermore, the establishment of a German organization begets confidence among the dealers, who are inclined to be less timid in buying when it is not necessary to have recourse to a foreign house if goods prove to be defective or unsatisfactory, or if there are misunderstandings or differences to be adjusted.

Policy is Advantageous

From a legal standpoint the policy is advantageous, in that it gives to the enterprise the character ot a legal entity or juristic person, organized and existing under German law, and therefore enjoying all the rights of any similar German undertaking and subject to the same and no greater liability. The German branch of an American export business, thus legally domesticated, can sue and be sued like any other German company, and does not have to put up security for costs no matter who the shareholders may be. It has its own set of books, with a capital and expense account; taxation is based upon the capital and upon the earnings as shown by the balance sheet. If it operate under patents or licenses it is at liberty to pay a reasonable royalty to the owners of the patent, which royalties are chargeable to expenses, and do not, therefore, enter into the profit subject to taxation.

Manufacturers'

Consul Frank S. Hannah, of Kehl, reports that interesting statistics have just been given out relative to the increase in the number of motor cars in Germany. The total number of machines in Germany per capita is far behind that in the United States, there being, for example, about one-half as many motor cars in Germany, with a population of over 60,000,000, as there are in the state of New York. What is known in America as the high-power car is not popular here; there were only 127 cars over 40 horsepower in Germany in January, 1910, as against fifty-four in 1907.

In 1910 there were registered in Germany 46,922 passenger cars, as compared with 39,475 in 1909, 34,244 in 1908, and 28,815 in 1907. Of commercial cars there were 3,019 in 1910, as compared with 2,252 in 1909, 1,778 in 1908, and 1,211 in 1907.

Small Cars Show Increase

Motor cars from 16 to 40 horsepower show an increase of nearly 200 per cent during the 4 years ended in 1910; in second place comes the small motor car up to 16 horsepower, with an increase of 120 per cent; and far behind comes the motor cycle, with an increase of only 40 per cent. The motor cycles registered in 1910 numbered 22,479, as compared with 15,954 in 1907; cars up to 8 horsepower, 14,020 in 1910, and 5,627 in 1907; cars of 8 to 16 horsepower, 7,953 in 1910, and 3,591 in 1907; cars of 16 to 40 horsepower, 5,362 in 1910, and 1,800 in 1907.

Accidents are relatively less frequent each year, although the traffic is greater. This is cited as proof that the stability and reliability of the present-day machines are of a high order. In January, 1908, there were 36,022 licensed motor cars, and for the year ending the previous September there were 2,419 accidents (6.72 per cent), and 145 deaths (0.42 per cent). January, 1910, 49,941 motor cars were licensed and for the year ending the previous September there were only 2,945 accidents (5.88 per cent), and 194 deaths (0.38 per cent).

From Consul W. Stanley Hollis of Dundee, Scotland, the following comes:

The motor car generally preferred in this part of the country is one of about 20 horsepower, selling at retail for $1,500 to $2,000. Of course, larger and more powerful motor cars are also to be found in this district, but the one described seems to be the best seller.

Some years ago French motor cars had a fair sale here, but as the British makers have been steadily improving their machines they have been getting a firm hold upon this market, and in consequence of the improved quality of the workmanship and materials entering into the construction of the British machines and of the reduced prices at which the makers are now able to sell them, these cars are now preferred to all others. Then, also, one must take into consideration the sentiment in favor of goods of British production, steadily growing.

Needs More Than Moderate Prices

Prices considerably lower than those for British-made cars of the same power and type now being offered in this market are quoted by American dealers, but it is to be feared that these moderate prices will not by themselves help much in securing a market here, for it is generally believed that the British-made cars are sold as low as possible consistent with good workmanship and materials, and as it is the firm belief of practically everybody in this country that motor cars can be made much cheaper in this country than anywhere else. When a motor car is offered at a price considerably lower than that of a British-made machine of the same power and type, the customer will very likely be slightly skeptical as to its quality and durability, and it is very unlikely that he can be convinced otherwise, especially if business is sought only through the medium of correspondence and the sending of catalogs and price lists.

The best way to introduce motor cars would be to send a competent salesman here with a number of cars and let him show the cars to the dealers and other interested parties, letting them see how they are made and of what they are capable. Many people, however, when purchasing motor cars, prefer to go to London for them.

The export of motor cars from France during the first 7 months of this year amounted to $20,376,000, an increase of $3,698,000 compared with the corresponding period of last year. Of this amount, the United Kingdom received motor cars to the value of $8,326,000, followed by Belgium with $3,675,000, and Germany with $1,552,000, all the figures representing substantial increases. The only countries showing decreased purchases from France are the United States of America, Spain, and Turkey. The principal imports into France were drawn from the United Kingdom, $254,600; Belgium, $256,500, and Germany, $268,000. There was a decline in the imports from Germany, Italy, and the United States of America, but those from the United Kingdom and Belgium showed notable increases.

Communications

ACCESSIBILITY IMPERATIVE

DETROIT, MICH.—Editor Motor Age—Despite the rapid strides that the design of pleasure vehicles has taken and the corresponding advance that has been shown by some makers of commercial cars, yet it is true that each year there are makers who start out and try to market cars, the design of which was obsolete 4 or 5 years ago. This is true even of some fairly large manufacturers who have profited by the lack of competition in this branch of the industry and have foisted on an optimistic public commercial cars that do not represent the true status of present day engineering.

Quite recently the writer saw a heavy brewery wagon drawn up beside the curb in one of our large cities, the kegs standing on the ground, and the driver working at the engine through the trap door in the floor. This was the first location for the motor power, and in this position the motor had the advantage of the best spring suspension, which was fortunate for the motor, as spring suspension had not been given its just consideration then. The serious disadvantages of these arrangements are at once apparent. If the slightest derangement occurred on the engine of a motor truck or the mechanism needed attention, even so slight as making an adjustment or the more necessary act of taking up a connecting rod, it necessitated the unloading of the car in order to get at the machinery through the trap door.

Placed under the driver's seat, the motor has the advantage of greater accessibility without sacrificing the length of the loading platform in reference to the wheelbase, which is a matter that must be taken into account in commercial designs. While this arrangement is an important advance over the former method, still the driver's seat must be lifted up to get at the engine and some makers who appreciate the inconvenience partially remedy it by placing the seat and footboard high enough to allow of partial access to the engine, but in attempting to dodge one horn of the dilemma they get caught on the other. Full accessibility is not attained and the driver is so high in the air that he loses valuable time and energy in getting on and off his car.

There is far more necessity for accessibility in a motor truck than there is in a pleasure car. Unless used for professional purposes, a matter of a few hours' to a few days' layout, for a pleasure car could ordinarily be put up without very much hardship. Not so with the commercial vehicle, whether it be truck, wagon, or taxicab, for what is said about accessibility in other commercial vehicles is just as true about the commercial passenger car. With these conveyances every idle hour means a loss of investment and a tie-up in moving the manufacturers' and merchants' products, and the successful car of the future must be so made that layups will be reduced to a minimum and to that end cars must be so designed that every working part will be readily accessible and replaceable, so that the operation of the whole car is not held up because of the failure of one part.

It is sad commentary on the way some cars are built to have a $3,000 or $4,000 investment standing idle for a day or 2 for no other reason than a broken $5 part took that much time to get at and replace. With a large percentage of the trucks and light delivery wagons on the market today, it requires as much or more time and money to disassemble and reassemble the parts as it does for the repairs. This is manifestly wrong and has been so recognized by some of our foremost designers. With the engine under the hood in advance of the driver's seat, every part of the operating mechanism is as accessible as in a pleasure car. It can be plainly seen that this is a vital part in modern motor car construction.

There is a drawback to this form of construction, but it is one that is very easily overcome. Built like a pleasure car, the commercial wagon would have a very limited loading space in proportion to the wheelbase and an undue proportion of the load would come on the rear axle. To preserve the loading space and still keep the wheelbase within practical limits to meet the demands of turning in narrow streets and around the loading platforms of warehouses and depots, the engine is carried farther forward in a truck than in a pleasure car, and the needed protection is provided for by heavy buffers integral with the main frame.

For all future success the motor truck must depend on the ease with which broken or damaged parts can be replaced, and more repairs must be possible outside the original factory. This means a strict adherence to standard materials and the absence of special threads and taps.—Oliver Motor Car Co., E. L. Sandgren.

CORRECTING MOTOR EVILS

New York—Editor Motor Age—The Garage Owners' Association of New York, with offices at 2228 Broadway, organized May 5, 1910, already has accomplished many of the objects for which it was formed. The latest victory of the association was the successful prosecution of garages giving short measure in gasoline. During the past month three garages were fined for violating the regulations of the bureau of weights and measures. In a civil action brought by Inspector Mills of the department of weights and measures against a garage proprietor on East One Hundred and Eighth street, New York city, for giving short measure in the sale of gasoline, a judgment of $100 was obtained against the proprietor, mainly through the evidence furnished by the Garage Owners' Association of New York.

The association is now on the trail of the motor dead-beat, or fly-by-night, as that class of car owner is sometimes called. The association is endeavoring to have a law enacted making it a misdemeanor for a car owner to surreptitiously remove his machine from a garage without paying the charges thereon. The lien given to the garage keeper by statute merely permits the garage owner to retain the car in his possession until the accrued charges have been paid. The lien is lost when the car leaves the garage, and so is ineffective to check the practice of the dead beat.

Owing to the large number of complaints received by the association from property owners and tenants residing in the immediate vicinity of certain garages relative to the unnecessary noise emanating from electric horns, etc., blown by chauffeurs endeavoring to obtain admission to the garage, the garage organization has sent notices to its members, aggregating fifty-seven garages, calling their attention to this nuisance and requesting them to adopt strict measures whereby the rest and comfort of the neighborhood may remain undisturbed. Through the efforts of the association, an injunction has been obtained enjoining a garage from permitting its patrons to blow horns during the night time. Several other cases are under consideration.—Garage Owners' Association.

CHANCE IN WEST INDIA

Detroit, Mich.—Editor Motor Age—A good opportunity exists in the West Indian islands for the sale of motor cars, especially runabouts, for doctors, planters and other persons who have a large mileage to cover. The use of such motor cars for station owners, sugar men, farmers and salesmen is also extremely important, and a big demand is steadily developing. Within the past year there has been a rush to take up agencies of motor vehicles, those of the lighter class, and it would be much easier for American motor-car manufacturers to sell their goods by means of direct agencies rather than by catalogue. Jose M. Sojo, of San Juan, Porto Rico, our agent there, advises us that there will be large purchases of motor cars when the money is distributed in prosperous Porto Rico, where more than 1,000 kilometers of splendid roads await the motor-car enthusiasts. Already there are 300 cars on the island; the demand exceeds the supply, and the manufacturers easily could capture the West Indian trade if machines were made to fit existing conditions. The climate is hard on rubber, leather and polished surfaces, and special attention must be paid to these fittings if the car is to become popular and enduring.—Abbott Motor Co., B. C. Spitzley, Assistant General Manager.

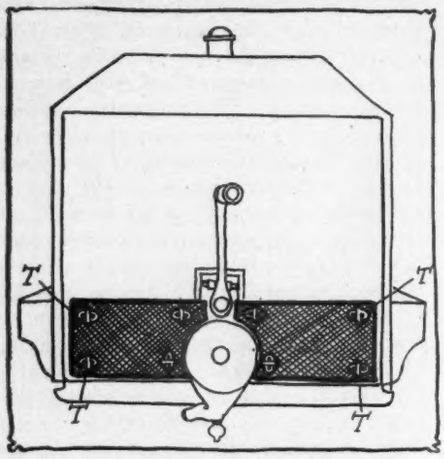


FIG. 1—TO PREVENT RADIATOR FREEZING

The Readers' Clearing House

PREVENTING RADIATOR FREEZING

STREATOR, Ill.—Editor Motor Age—Through the Readers' Clearing House, will Motor Age kindly answer the following questions:

1—What are the different formulæ and solutions used in winter to prevent the radiator from freezing, and what, in the opinion of Motor Age, is the best?

2—What are the advantages of waterjacketed carbureters, if any, and how are they drained? —L. D. Howe.

1—The various anti-freezing solutions in common use were published in the November 10 issue of Motor Age, on page 32, and repeated on the same page of the issue of December 1. Mixtures of alcohol and water are the most popular, and the proportions of these were given in last week's issue of Motor Age.

2—The advantages of a waterjacketed carbureter are: more efficient carburation and consequent increased motor efficiency. By properly heating the mixing chamber of a carbureter, more complete evaporation of the fuel is obtained, which tends toward greater economy in fuel consumption and more complete combustion of the charge. A plug or petcock is generally provided at the lowest point of the waterjacket for the purpose of draining it.

USING CALCIUM CHLORIDE

St. Paul, Minn.—Editor Motor Age—Through the Readers' Clearing House will Motor Age kindly answer the following questions:

1—Kindly give directions for using calcium chloride to prevent freezing; also give a list of the mixtures containing various mixtures and their freezing points.

2—Is calcium chloride suitable for small stationary engines and does it have any effect on the cylinders or piping?

3—What will dislodge scale that forms in the waterjackets after it has become ⅛ inch thick or less?—A. E. W.

1—Calcium chloride, $CaCl_2$, is a very effective cooling agent, but unless the chemically pure agent is used, there is danger of corrosion of the metal with which it comes in contact. Crude calcium chloride retails at about 8 cents or 10 cents per pound, and is to be avoided, but the chemically pure article required costs about 25 cents a pound when bought in small quantities. A solution of 5 pounds of calcium chloride to each gallon of water will not freeze at any temperature above 39 degrees below zero. The following table will show the proper proportions of a calcium chloride solution for the different temperatures:

For each gallon of water	Freezing point
1 pound	27
2 pounds	18
3 pounds	— 1.5
3½ pounds	— 8
4 pounds	—17
5 pounds	—39

The best way to prepare this solution is to make what is called a saturated solution, then add water to it until the required mixture is obtained. To make a saturated solution, mix with a quantity of water warmed to 60 degrees Fahrenheit all the calcium chloride the water will dissolve. If chemically pure calcium chloride is used no trouble will result, but chloride of lime, $CaOCl_2$, often sold as pure calcium chloride, should not be used. It has been advised that a handful of lime be added to this solution to render it alkaline. This is done to prevent an acidic action of the solution on the metals and its consequent setting up of destructive electrolytic action.

IMPROVISING A CARBURETER

Chicago, Ill.—Editor Motor Age—My garage is not heated, hence it is quite an effort to turn the engine over these cold mornings, although a very light oil is used. The gasoline we get is really naphtha and will not vaporize sufficiently to start the engine readily, hence I have inserted a priming cup Fig. 4 in the manifold, which I use for the purpose of inserting a few drops at a time of hot gasoline from an ordinary oil can. Formerly, upon pulling the engine over the center the third time, I would get one or two explosions. When the process was repeated I sometimes get two or three explosions, and so on. I now insert the spout and leave the can standing inverted. The engine will not only start, but keeps on running, and in about 6 seconds will use all of the hot gasoline in the can, but it does not stop.

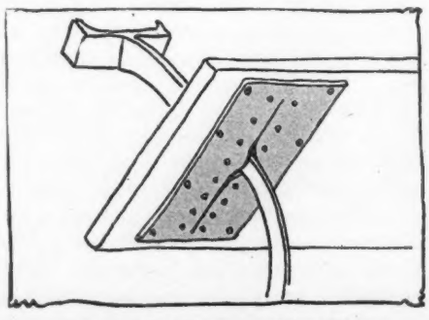


FIG. 2—TO PREVENT COLD FEET

EDITOR'S NOTE—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated.

A friend of mine recently has been complaining bitterly about the cold air coming in round the floor of his coupe through the slots in the floor in which the levers operate. A simple matter like this was found readily overcome by using the flat section of an old inner tube, fastening it firmly with tacks underneath the floor board all around the slot and then cutting a slit in it the length of the opening. This simple arrangement, Fig. 2, works perfectly. No more cold feet.

We see the result every day of many funny attempts to prevent the water in the radiator from getting too cold or freezing in cases where it is only water. Some drivers will cover the front of the radiator entirely with cardboard and others only partially. Sometimes the cardboard is put on vertically, covering half of the radiator, and sometimes across the top, and again across the bottom, and in other cases a circular hole being left only in the middle. As a general theory an engine will run better and more economically when it is quite warm or hot, and this is probably the object aimed at by those drivers who use alcohol or other similar means to prevent freezing, while those who use water only must necessarily have in view the fact of ice forming in the radiator when the water is extremely cold by reason of too much exposure or circulation of air. One of the best and most uniform methods is to remove the fan belt during cold weather and, if a further preventative is needed, only use a strip of cardboard or oilcloth, as in Fig. 1, about 4 inches wide, across the bottom of the radiator, never the top.—Frank X. Mudd.

ADJUSTING BEARINGS

York, Pa.—Editor Motor Age—Will Motor Age advise me, through the Clearing House, how the connecting rod or crankshaft bearings should fit? I use a brake and do not release the sides, therefore I get a solid bearing from the start. Should I release the sides or not? It has no pinch on the pin.

2—How much clearance should a piston have from the bore of the cylinder?

3—Should a piston be tapered from the last ring to the top, and how much?

4—Will improper timing cause a motor to slap? If not, what will?—Trouble.

1—It is customary to trim away or release the sides of each half of a split bushing of a crankshaft or connecting

Clearing House

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

rod bearing for the purpose of preventing binding as the bearings wear in, and to facilitate spreading of the lubricant.

2—In a water-cooled motor a piston should have a clearance of about .001-inch all around, which means that the diameter of the piston should be about .002-inch smaller than the bore of the cylinder. Many give more clearance.

3—It is customary to taper a cylinder from the lowest ring to the head, the diameter at the head being about .002-inch smaller than that below the last ring. In an air-cooled motor more clearance is given; in the Franklin, for instance, there is a difference of .003-inch between the diameters of piston and cylinder bore below the rings, and the pistons taper towards the head to a difference of .005-inch.

4—Providing the piston is a loose fit in the cylinder, bad timing of the ignition will cause a slap, otherwise pre-ignition would cause a knock. A loose piston or excessive end play in crankshaft bearings often give rise to slapping noises.

WHY SPRINGS BREAK

Wilkes-Barre, Pa.—Editor Motor Age—Engineers: Let us reason. Heretofore the minds of engineers have been riveted on their motive power, transmissions, clutches and various perplexing things that go with the building of a motor car. I feel that they have paid too little attention to the matter of breakage of springs in the center. Note this—If the center attachments are planned strong enough and are perfect fits so a broken spring could be used, there never would be one broken. Make them break outside and then it is the fault of the springmaker. In Fig. 3 are a few recommendations that I would like to make: Have the spring seats or lower bearings of proper length and made the exact radius of the spring normal. If these clips with a slightly sharper curve size. Plan a top plate P to go underneath these clips with a slightly sharper curve than the radius of the spring normal, and have it strong enough in thickness so it will be impossible for a spring to move underneath it at the center. I would recommend using between the spring and its lower bearing duck No. 6 or No. 8 CI, saturated with lead and oil. This will preserve the fiber, and when drawn down tight there will be no material to displace. Do not use material under a spring that will displace while in use. Use as heavy a spring washer W under the nuts N as the stem of the clip will compress without injury. I would recommend for a light runabout, where 1¾-inch steel is used, a clip with ½-inch shank. For a five-passenger car, where 2-inch steel is used, ⅜-inch shank. For a seven-passenger car, where 2¼ or 2½-inch steel is used, ⅝-inch shanks. In each case use spring washers as thick as they can crush without injury to the clip shank. Many are using a single clip. When these are used, care should be taken that the inside of the clip is of the same radius as the spring is normal, so it will absolutely bind the spring tight in the center.

If one will observe these recommendations, I think he will eliminate the breakage of the springs in the center, which is no fault of the springmaker. Some are using springs which are called beaded center. In my mind there is nothing gained by this. If a spring is held down firmly in the center and not allowed to move, it cannot crystallize and will not break. Just bear in mind if you plan your attachments so you can use a broken spring, you will have none break.—R. D. Woodford.

STOPPING RADIATOR LEAK

Center Junction, Ia.—Editor Motor Age—Will you kindly advise me through the Readers' Clearing House what I can put in a leaky radiator that will stop the leak, as I am unable to locate it so as to solder it.—A Subscriber.

It is reported that leaks have been stopped by putting a couple handfuls of bran in the radiator, but Motor Age does not recommend this method. If you will fill your radiator with water and apply air pressure to it, you undoubtedly will find the location of the leak. After the leak has been found, mark the place, remove the water, and place the radiator in a warm place for a day or 2 so that it will dry out thoroughly, then solder. It is very difficult and often quite impossible to solder a radiator while still wet on the inside.

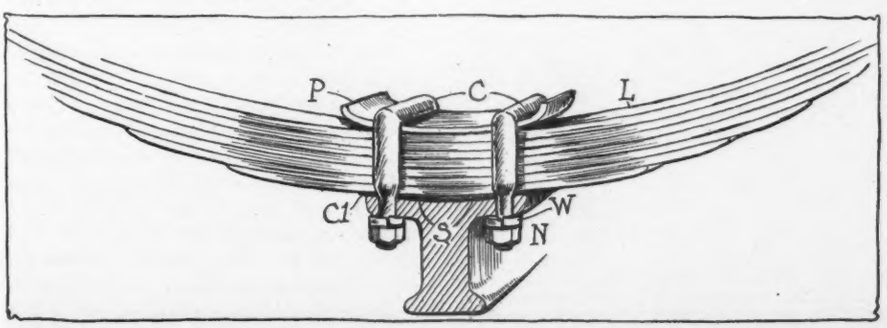


FIG. 3—SUGGESTION IN SPRING-PLATE DESIGN WHICH IS CLAIMED WILL PROLONG LIFE OF SPRINGS

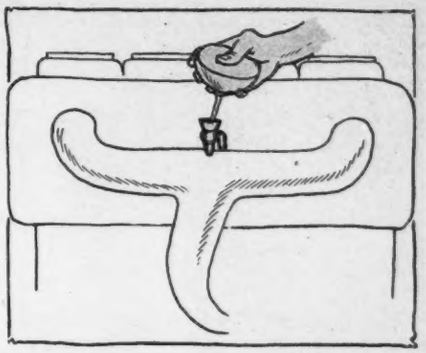


FIG. 4—FOR PRIMING FORD MOTORS

CARBON IN THE CYLINDERS

Sauk City, Minn.—Editor Motor Age—I have been troubled more or less with carbon in the cylinders of my roadster, and find when it is there in large quantity it not only kills the power of the engine and causes a lot of other trouble which costs money to be rid of. After much experimenting I have found this simple remedy will not only clean out the cylinders, but costs hardly anything to do it.

This is how I treat my four-cylinder car: Take a quart of kerosene oil and put into it say a half teacup of turpentine, shake well until thoroughly mixed, then put into a good squirt oil can with a good spring bottom; now, after a run when the motor is warm and fires fine, take the can and squirt a quantity into the air intake of the carbureter, which will cause the engine to slow down, when you must stop putting in the oil until the engine picks up, which it certainly will do, and then repeat this until a cloud of very black smoke comes from the exhaust. Now keep squirting in the mixture until the engine is stalled or stops and leave it until next morning, when you will be surprised at the easy manner in which it can be cranked and started. If it should be in cold weather you may have some little trouble in starting, but this is easily overcome by putting a blow pipe on the intake pipe until it is very hot so you can hardly touch with the hand, being careful not to allow the flame of the blower to enter the carbureter, in which might be gasoline enough to take fire and burn. You can now start the engine by the first or second quarter upturn of the crank. Of course you will understand that the same movement of the throttle and spark levers must be as if you were just starting on gasoline and no kerosene was in the cylinders and perhaps a part of the carbureter and intake pipe. You will adopt this way of getting rid of the carbon in any and all makes of cylinder oils

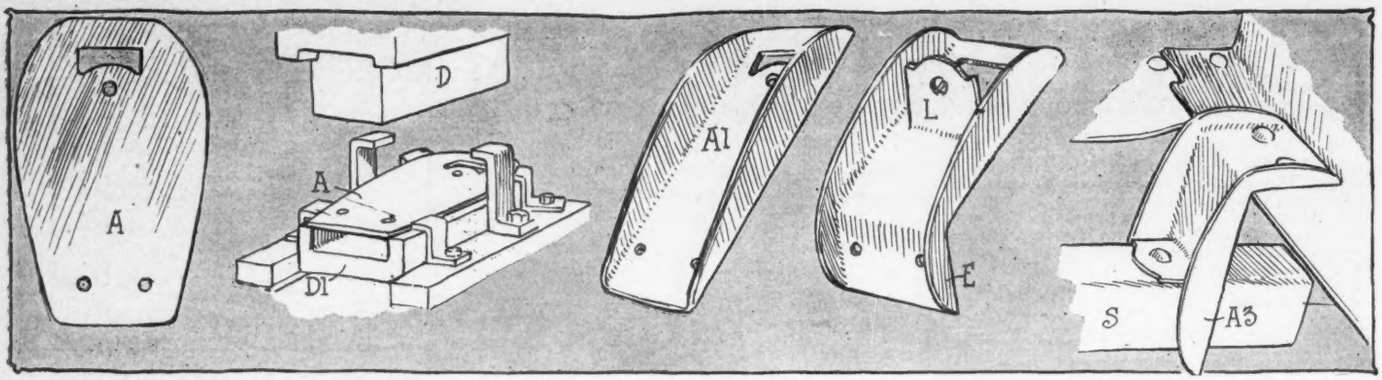


FIG. 5—SHOWING STEPS IN PROCESS OF MAKING A SHEET-STEEL STAMPING WITH MANY ANGLES AND SURFACES

in greater or less quantities, and this is very easily done and saves the expense and bother of dismantling your engine. Many times I take and open the priming cocks and squirt a quantity of this mixture into the cylinders and allow it to stand for the time I am not using the motor car, and never have any trouble in starting the motor even when cold. Of course the light oil will seep past the pistons and find lodgment in the crankcase, but you can easily draw off this oil and replace with fresh oil, as should be done every week or 2 when the car is in daily use. I never dismantle my engine to get rid of the carbon, and I have one of the quietest, smooth-running engines on the market.—A. D. Carpenter.

TAIL-LIGHT SIGNAL CODE

Cleveland, O.—Editor Motor Age—I am illustrating in Fig. 6 a device which consists of a combined signal and tail lamp in connection with a special forked bracket B, so made that it will carry both the light and the number plate. Fig. 8 shows the wiring system.

The front or face of the lamp is fitted with four bull's-eyes 1, 2, 3, 4, No. 4 being green, No. 2 red and the remaining two white. The upper three constitute the signal device, the lower one acting as the tail lamp or danger signal, and also casting a white light through the glass-covered aperature in the bottom of the lamp directly upon the number plate, which, owing to the compound curved shape of the forks. is held at the rear of and directly under the lamp.

The signal system may be operated either by means of a switch located within the rim of the steering wheel or at any other convenient place desired, or automatically. It is not practical to operate the turning signals automatically, owing to the fact that the turning signal should be given before the turn is made. The stop signal could be operated to advantage automatically.

The signals are operated as follows: Pressing the button marked on the switch, lights the green light and the white light No. 1, thus signalling that a turn to the right is to be made. The fact that the red light is lit helps to positively determine the location of the white light.

Pressing another button lights the green light and No. 3 white, thus signalling that a turn to the left is to be made. Pressing a third button lights the two white lights and signals stop or caution. A double-throw switch controls the lighting and turning off of the tail lamp.—G. E. Neil.

POWER FOR MOTOR BUS

Thousand Island Park, N. Y.—Editor Motor Age—I desire some information as to the motor power to run a bus-type wagon about 18 feet long and 7 feet wide. It has large, heavy bus wheels, wood hub, iron rear axle, and heavy iron and wood front axle, and has been drawn by horses. I have a 4-horsepower engine and an 18-horsepower engine. Can these be used with additional appliance, or must there be a combined outfit—M. J. Bates.

It would be cheaper and far more practical in the end to buy an up-to-date motor truck than try to make one with the parts that you have on hand. The 18-horsepower motor if a good one will give enough power but you will undoubtedly have to spend a great deal of money on ignition outfits, carbureter and other parts.

WINTON FUEL CONSUMPTION

Iowa City, Ia.—Editor Motor Age—Will Motor Age kindly answer the following questions through the Readers' Clearing House:

1—What is the approximate mileage per gallon of gasoline of the Winton six, under ordinary road conditions, carbureter properly adjusted?

2—Will Motor Age kindly describe briefly the Winton lubrication system?

3—At how many revolutions per minute is the Winton six engine designed to run to develop its maximum horsepower?—G. H. Meinzer.

1—Winton representatives claim an average fuel consumption of about 12 miles to the gallon under ordinary road conditions.

2—The Winton motor is lubricated by means of a circulating oil system, with force feed direct to the main crankshaft bearings and engine gears, and splash feed for the cylinder and internal mechanisms of the crankcase and cylinders. A plunger pump, operated by an eccentric on the rear end of the crankshaft, takes oil from the oil tank at the left side of the motor, and delivers it through leaders to the crankshaft main bearings and the front engine gears. A second pump, operated by the same eccentric, draws oil from the crankcase, where it is deposited by gravity, and returns it to the oil tank, where it passes through a strainer before being used again. This system of lubrication is claimed to be reliable, effective and economical. Motor Age never has received any complaints or criticisms against it.

3—The rated horsepower of the Winton motor is obtained at about 1,500 revolutions per minute. It is, of course, capable of running at a higher speed and developing more power.

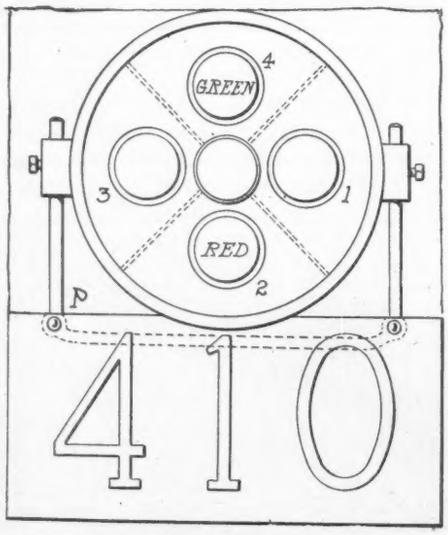


FIG. 6—TAIL-LIGHT SIGNAL CODE

MAKING A STAMPING

Chicago—Editor Motor Age—I frequently read about stampings being used for car parts, but I am not clear on how a stamping is manufactured. I understand what forgings are and would like to know what a stamping is.—Reader.

From its name a stamping suggests something that is manufactured entirely by stamping machines, in contrast to being hammered into shape like a forging. A stamping is made from a sheet of steel, which may be from 3-16 to 5-16 inch thick. In Fig. 5 with its parts the manufacture of a simple stamping is best illustrated. The first step in the process is not illustrated, but consists in cutting out of a sheet of metal horseshoe-shaped pieces A, which finally become the A3 piece Fig. 5, which

is the finished product. After it is in the A stage the horseshoe piece is placed in a stamp, part 2, to have the edges turned up, as illustrated in Fig. 3. The operation consists in the press D lowering and pressing the piece A into the U-shaped die D1, giving it the permanent form of part 3. In another press the end E, part 4, is bent to final shape and the lip L pressed out. This completes the process and the part is ready to be used to support the sub-frame member S in a car framework. This is a forging used on the Mitchell car.

EASY STARTING FOR FORD

Iron Mountain, Mich.—Editor Motor Age—Owners of model T Ford cars who have trouble with their motors missing or skipping in cold weather can overcome this by putting on a tight tin or copper pipe to take the hot air off the exhaust pipe and connect it to the lower opening on the carbureter. A T connection should be put in the pipe so as to admit some cold air if the exhaust gives too much heat. One can stand all he gets during the very cold weather. Be sure the pipe is at least the full size of the carbureter. This plan of putting on a master coil in connection with my old one has made the running of my motor almost perfect. The consumption of gasoline will be decreased and a new adjustment of the carbureter should be made.—Hot Air.

REASON FOR MISSING

Manteno, Ill.—Editor Motor Age—Through the Readers' Clearing House will Motor Age kindly answer the following questions:

1—I have a model F Buick and when I speed up the engine it misses and runs on one cylinder when the spark is advanced, but when half closed it does not. It explodes in the exhaust pipe and muffler, causing it to burst. The plugs have been thoroughly cleaned.

2—I recently put in new batteries and after going 10 miles they were dead the next morning. Would short-circuiting wear them out?

3—Does the Buick make a seven-passenger car? If so, what is the horsepower and price?

4—What is the price of the 100-horsepower Marquette-Buick, and its speed?—A. Olston.

1—If your car is equipped with a magneto, look for a dirty distributer, dirty or badly adjusted contact-breaker points, or a broken or short-circuited wire. If a timer and coil are used, look for badly adjusted or burnt platinum points on the vibrators of the coil, loose coil or battery connections, weak batteries, or bad ignition cables. It is also possible that the switch is in disorder. The explosions in the exhaust pipe and muffler are due to the misfiring, the unignited charges which pass on through the misfiring cylinder being ignited by the exhaust gases of the firing cylinder.

2—It is most probable that either you let the car stand for some time—over

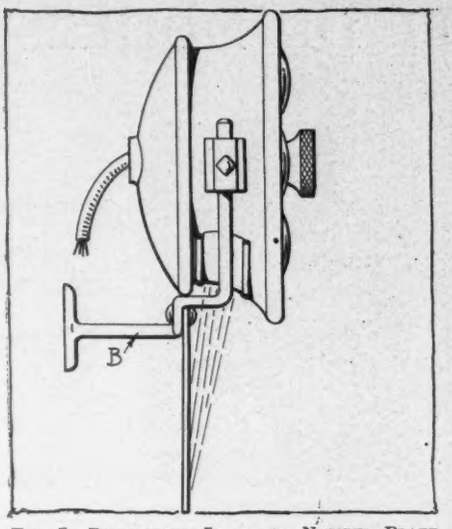


FIG. 7—REFLECTING LIGHT ON NUMBER PLATE

night, perhaps—with the switch turned on, or there is a short-circuit in the switch, or the primary wiring between the switch and batteries. If your battery is a metal one, some of the connections might be touching the sides of it; or if water has gotten ing the sides of it.

3—There is no seven-passenger Buick, but the General Motors Co., manufacturer of the Buick cars, makes a seven-passenger Welch-Detroit 50-horsepower car which sells at $3,000, a 60-horsepower Welch-Pontiac for $4,000 and a six-cylinder 75-horsepower Welch-Pontiac for $6,000.

4—The 100-horsepower Marquette-Buick sells for $3,950, and on July 4, 1910, at the Indianapolis Speedway went ¼ mile in :08.5, an average of 105.87 miles per hour.

THE LOZIER SWITCH

Selma, Ala.—Editor Motor Age—Will Motor Age, through the Readers' Clearing House, kindly answer the following questions:

1—Of whom can I purchase a magneto and battery switch, same as used on the 1910 Lozier cars, located on the steering column?

2—Will I have to change in any way my Schebler carbureter if I use a pressure feed gas tank located at the rear of the frame, instead of gravity feed as now used?

3—About what air pressure should I keep on a 30-gallon gasoline tank?

4—Is there an enamel that is successfully used at home, with which I can enamel my brass lamps a green color? If not, what reliable firm can I get to do this work for me?—Joe S. Lamar.

1—The magneto and battery switches used on the 1910 Lozier cars are made by the Connecticut Telephone and Electric Co., 34 Britannia street, Meriden, Conn., and may be obtained therefrom.

2—No. But you will have to use an auxiliary gravity feed tank of about 1-quart capacity between the pressure tank and the carbureter.

3—About 1½ to 2-pounds pressure is generally used.

4—An enamel to give successful service on parts subject to heat, as the lamps are, must be baked on. If there are no japaners in your vicinity with facilities for doing this sort of work, send the lamps to Jukes & Schafer, 324 South Desplaines street, Chicago, with a sample of the shade and color desired.

RAYBESTOS AS CLUTCH FACING

Hancock, Wis.—Editor Motor Age—Will Motor Age kindly answer the following:

1—Why is red vulcanized fiber or raybestos brake lining not a good substitute for leather in replacing the facing of a cone clutch?

2—If either of the two substances can be used in the place of leather, why do not some of the cone clutch manufacturers use it?—Emory B. Jones.

1—Raybestos is a good substitute for leather, providing it is kept clean. If the clutch is in a position where the lining is liable to be soaked with oil or grease, the rubber used in its composition will be dissolved and the lining will become so sticky that the clutch will not give good service.

2—This friction fabric now is being used on the cone clutches of a number of cars, among which are the Falcar, Oldsmobile, Great Western and Adams.

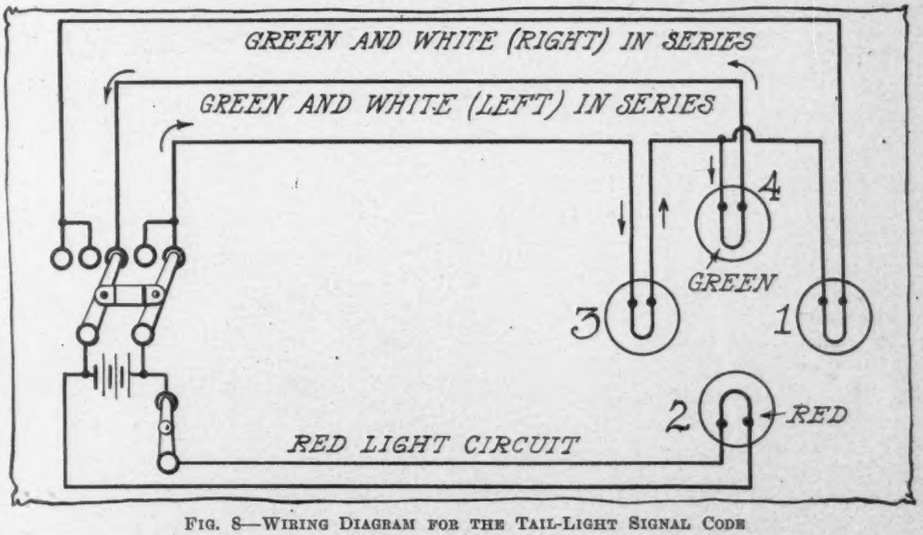


FIG. 8—WIRING DIAGRAM FOR THE TAIL-LIGHT SIGNAL CODE

THREE MITCHELL 1911 MODELS SHOW LIBERAL

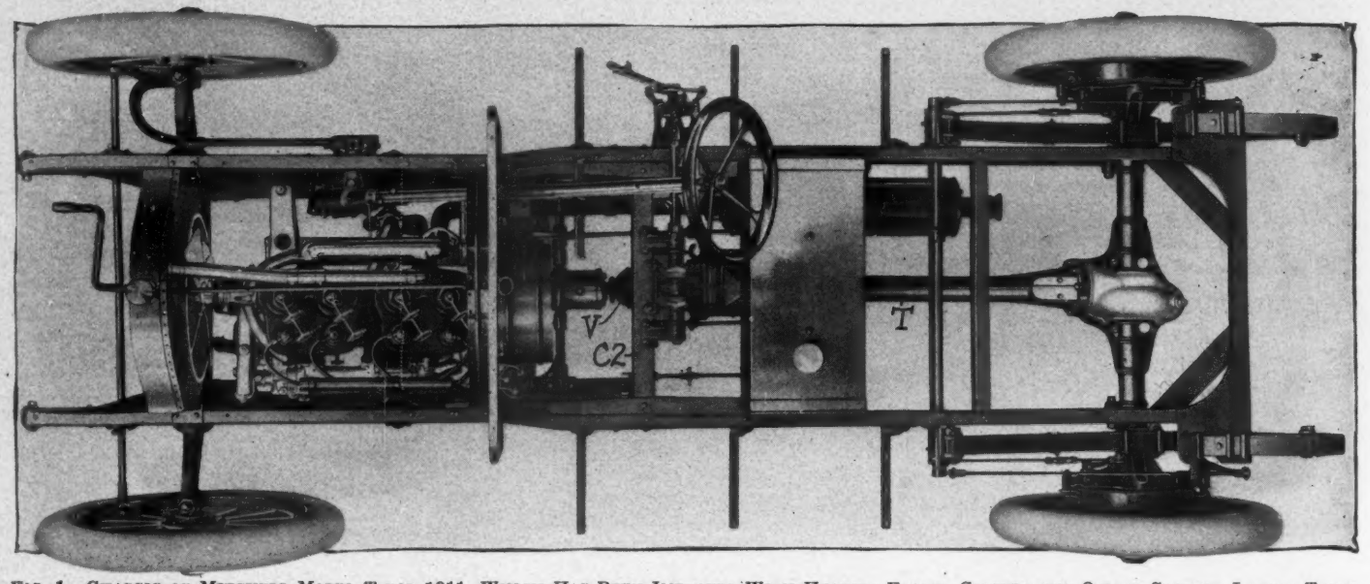


FIG. 1—CHASSIS OF MITCHELL MODEL T FOR 1911, WHICH HAS BEEN IMPROVED WITH HEAVIER FRAME, CIRCULATING OILING SYSTEM, LARGER TIRES, AND MANY OTHER IMPROVEMENTS

FOR next season the Mitchell Motor Car Co. will continue to market three models, as it has done this year, two of these models being four-cylinder types and the other a six-cylinder design. Although the program of marketing the same types as this year is continued, many improvements have been made, all of which have not been made in all of the models, the exceptions being noted at the end of the description. For the present the characteristics in the Mitchell construction will be taken up.

The Mitchell construction possesses several characteristics not found in other cars, and these must be noted. First, the company continues cylinders cast in pairs, which it adopted a year ago, and places the exhaust valve in the center of the cylinder head, as illustrated in Fig 4, in which position it has every opportunity of being well waterjacketed and is in the direct path of the expanding burnt gases after the explosion takes place. The intake valves are carried in an offset on the left side of the cylinders. The use of cast iron for the crankcase is continued in the lower half, which metal is also used in the gearbox so that the use of aluminum is confined to the top of the crankcase and the cover of the differential. A third characteristic which is continued is the unit construction of the gearbox with the rear axle. This is made possible by the cast steel torsion tube T, Fig. 1, forming a rigid neck between the differential housing and the gearbox. The gearbox is hung trunnion fashion from the cross member C2 of the frame, and at this point is the only universal joint V employed in the system. This is the second year for this construction.

In all three of its models the same cylinder size is used, namely, 4¼-inch bore and 5-inch stroke. This is the same as used this year. The economy of manufacture in three models using the same cylinder castings will be recognized as compared with other concerns having as many different models and a different cylinder size for each. In fact, all through in the Mitchell line for next year the spirit of conservatism is very pronounced. For example, there has been no change in the wheelbase of any of the models; the bodies remain practically the same except in one case; the steering mechanism remains the same; the gearset design remains the same except for a slight change in the bearings; and the vertical-tube radiator remains the same.

Rubber Hose Used

It is, however, with the various changes that the engineering and business department have deemed necessary that attention is now invited. In the water cooling system one of the changes is the use of rubber hose H, Fig. 2, from the cylinder heads to the radiator, as well as from the water pump to the jackets. Heretofore brass tubing was used. With the new construction a union U is threaded into the top of the rear cylinder casting and a T-shaped union U1 into the front cylinder. To these are clamped the hose connections H. The use of hose H, Fig. 4, between the pump and the jackets is also shown. The Mitchell company has always been a pioneer in the use of stampings instead of forgings or castings in car parts, and a novel and economical example of this principle in the construction of the fan, Fig. 2, in which the four blades and the ring-shaped hub are formed in one stamping, and to add rigidity a peripheral ring P is attached, supporting the outer ends of the blades.

The enterprise of the company in the stamping field is amply demonstrated in the improved frame construction on all models for next year. The frames are heavier on all models, the side members

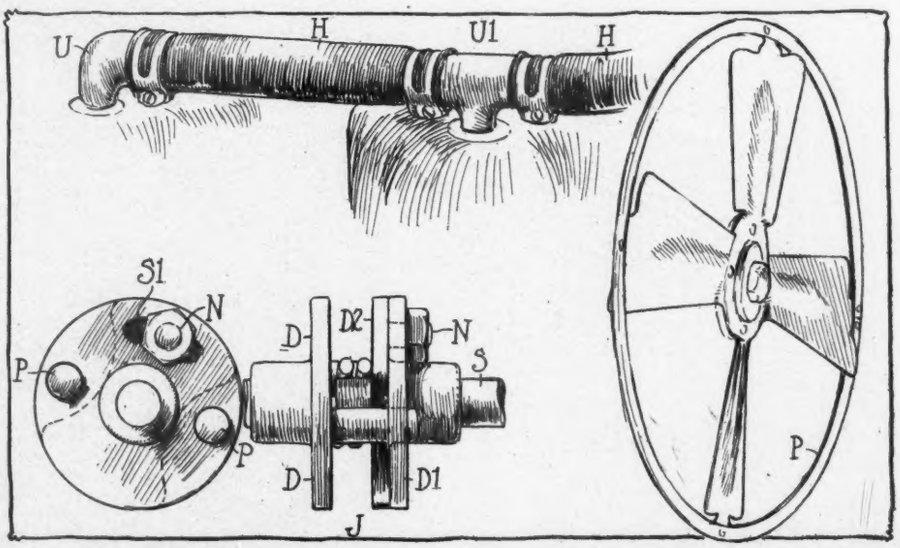


FIG. 2—HOSE CONNECTIONS IN MITCHELL WATER SYSTEM. THE FAN WITH SPOKES FORMED IN ONE STAMPING. THE MAGNETO COUPLING SHOWING HOW TIMING CAN BE CORRECTED

USE OF STAMPINGS IN MOTOR AND CHASSIS

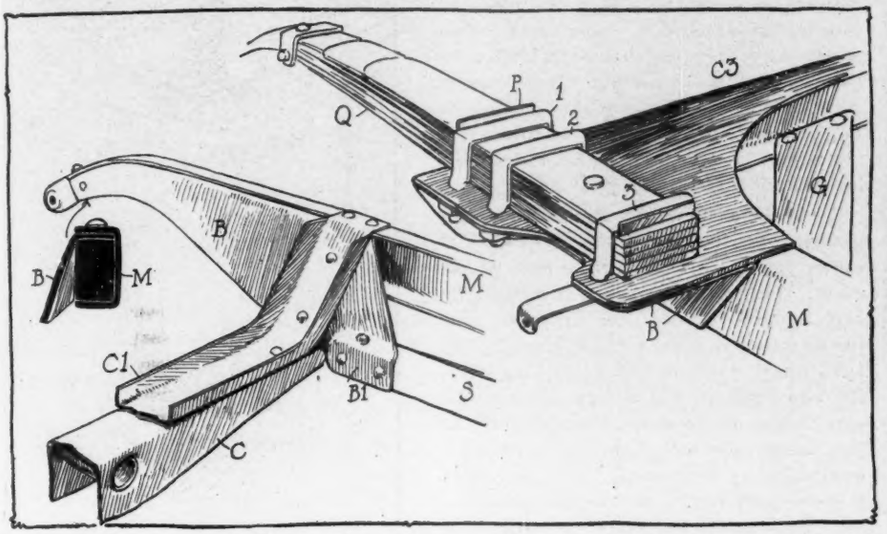


FIG. 3—FRONT AND REAR ENDS OF MITCHELL FRAME CONSTRUCTION. THE RADIATOR IS CARRIED IN A SPECIAL CHANNEL CROSS PIECE C1. THE REAR SPRINGS ARE ANCHORED BY THREE CLIPS TO THE FRAME CROSS PIECE C3

in the two four-cylinder models being made as heavy in gauge as the six-cylinder was this year. The company has its own machinery for stamping its frame members, which is doubtless responsible for the carefulness in detail as exemplified in Fig. 3, showing the front end construction as well as the rear. The side section M appears, as does the subframe member S, on which are carried the motor and gearbox. This submember is supported by a reinforcement B with a termination part B1 stamped to form a carrying bracket for the submember. In front of the cross member C the part B forms a shield to prevent mud being splashed into the radiator. Instead of the radiator being carried direct on the cross member C, a reinforcement C1 with its channel upwards is added, the radiator resting within it. At the rear end the cross member C3 is made to embrace the side member of the frame and carries the upper quarter Q of the three-quarter spring. A reinforcement plate B acts as a brace and takes the three spring clips 1, 2, 3, which give the spring an exceptionally long anchorage. Between the spring and the three clips is a plate P, the usual heavy gussets G are in place. Further frame details appear in Fig. 7 on another page, this showing how, where the side member is offset at the dash, there is inserted a channel reinforcement R. At the point of heaviest reinforcement the crossmember C2 is carried. From this crossmember through a unique stamped support K, the rear end of the submember S is carried. A still further example of the Mitchell stamping is seen in the bracket B, forming a support for the dash. In the matter of stampings the company has gone still further, as this illustration shows a running board bracket formed in this manner. Brackets of this type are much lighter than forgings and afford the requisite strength. The lower cost of manufacture is a quantity to be reckoned with.

On all of its models the Mitchell company uses a Splitdorf low-tension magneto with the current raised in voltage by means of a non-vibrating coil which is now carried under the toeboard instead of on the dash. An emergency system includes a set of six drycells. But one set of plugs is used, these being carried over the intake valves. A positive form of clutch is employed for the magneto coupling, which allows of accurate setting of the magneto. This is illustrated in Fig. 2, and consists of two disks D and D1 carried rigidly on the shaft and being united by two pins P. The shaft S connects with the magneto and carries a partial disk D2. This disk anchors to the disk D1 by a bolt N, passing through a slot S1 in the disk. By loosening the nut on the bolt N the bolt can be moved through the slot, and thus the position of the magneto armature changed with reference to the crankshaft of the motor, so that the desired timing can be obained.

Housing For Timing Gears

One Mitchell detail in the motor, shown in Fig. 4, is the detachable two-part aluminum housing for the timing gears. It is common construction to have this housing an integral portion of the crankcase, but not so here. It is an entirely separate housing. This has undoubtedly been done to facilitate examination or removal of the timing gears and is interesting from a manufacturer's point of view.

In the two four-cylinder models a most important motor change is the installation of a circulating system of oiling for the motor, instead of the mechanical oiler heretofore used. Fig. 10 illustrates the details showing, as it does, the lower part of the crankcase, with the oil reservoir extending under one side of it. The oil pump OP is shown and is a plunger worked by an eccentric on the camshaft. This eccentric forces the pump plunger P down and the spring S raises it. The plunger has a mushroom head F against which the eccentric works. By this pump the oil is delivered into the two compartments of the crankcase. In the center of each compartment is an adjustable overflow pipe O, the height of which pipe can be changed from the base of the reservoir. By changing the height of these pipes the oil level is altered and consequently the amount of oil fed to the motor changed.

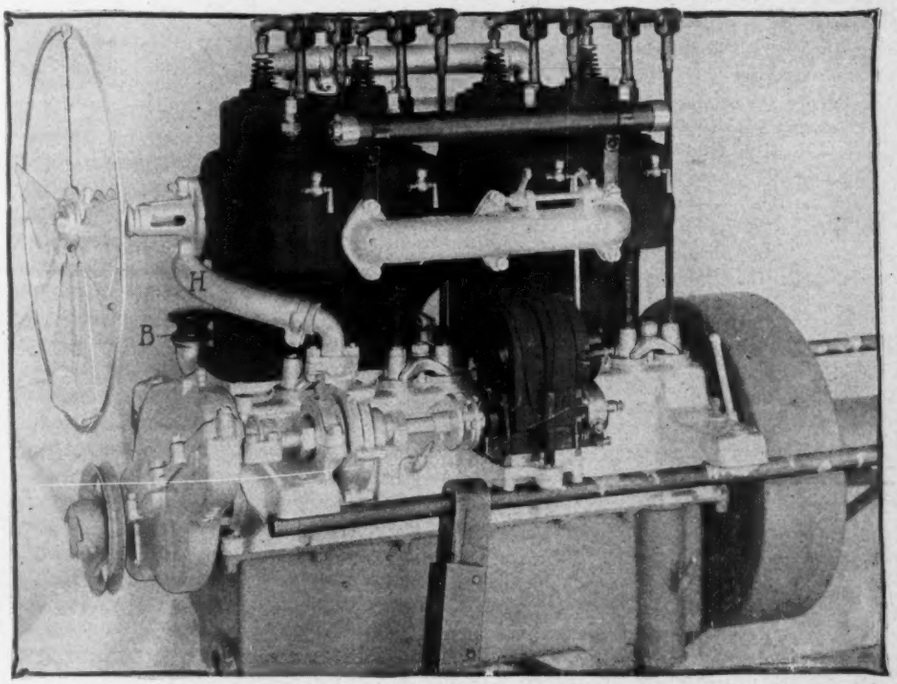


FIG. 4—MITCHELL MODEL T MOTOR FITTED WITH CIRCULATING OILING SYSTEM, WHICH INCLUDES A PLUNGER PUMP WORKED BY ECCENTRIC FROM THE CAMSHAFT

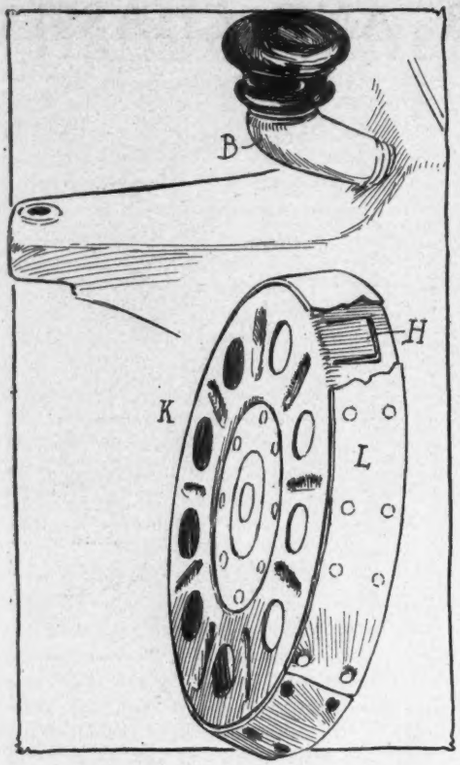


FIG. 5—THE OIL FILLER B IS ACCESSIBLY CARRIED ON THE RIGHT FRONT MOTOR ARM. THE CONE CLUTCH IS A STAMPING, LEATHER COVERED AND HAVING THREE INTEGRAL SPRINGS H UNDER THE LEATHER

The motor is further lubricated by grease cups, one being mounted on the front end of the pumpshaft. Fig. 5 shows the improved oil filler B mounted on the right front motor arm. The oil fed through this goes direct to the oil reservoir.

On all three models the crankshaft diameter has been increased at the three mainbearings from 1⅞ to 2 inches. The ports in the exhaust valve cages have been made ¼ inch higher and wider, which gives the same result as increasing the valve diameter.

Before dismissing the motor two other improvements must be referred to. Both are seen in Fig. 6. The upper half of this illustration shows how the exhaust valve cage is held in place by a threaded ring R instead of by yoke and two studs. This gives a simpler and neater construction. The lower half of the illustration shows the crowfoot yoke Y used for holding the two lifter guides G and G1 for the intake valves of a cylinder casting. This yoke is a stamping and is held in place by the nut N; but the nut N has to be locked and this is accomplished by pressing the stamped clip L over it, this clip having a hexagon opening to take the nut N and its two arms spring inwards so as to anchor it in place. This is a novel yet positive locking method.

The matter of stampings in the Mitchell car goes still further. Fig. 5 shows the cone clutch, which is a one-piece stamping K liberally perforated as shown. This takes a leather facing L riveted in place, and to ease clutch engagement three squared-shaped portions H of the clutch face are cut free at three sides and pressed outwards, so that they take the place of coil springs as used in other types. This is one more example of the elimination of parts that is made possible by the use of such stampings. Forming this portion of the clutch of a stamping greatly reduces the weight, a consideration not to be overlooked, as it facilitates gear shifting.

A change made in the Mitchell selective gearset appears in Fig. 8, in which G shows the cast iron gearbox and K the cover. This year the cover is secured by half a dozen screws, but for next year the stamping K is anchored in place by the hand wheel, which operates a locking yoke, the two arms of which lock beneath the upper edges of the case. The simplicity of this design and how it tends towards accessibility are meritorious. The gearset is a three-speed one, with the mainshaft on top. Both shafts and gears are made from nickel alloy steel. New Departure bearings are used, a double set being employed to carry the forward end of the mainshaft. The torsion tube, which connects the gearset with the rear axle, is seen in Fig. 9, which also contains the top view of the gearset, showing how the complete set is supported on a trunnion at V. This trunnion is further carried on a hinge, which allows of a back-and-forward movement at this point. The propellershaft within the torsion tube T is made up of three parts, a short stub shaft P S on which the pinion P is carried, an intermediate part C and the forward portion, not illustrated. This year this shaft is in one piece. Making in three pieces allows for a freedom of movement and rotation not possible in a one-piece shaft. A further change is an opening in the torsion tube at H which allows of adjustment of the relation of the pinion P to the bevel gear in the differential. This is accomplished by a spanner engaging with the lock ring S.

On all Mitchell models double rear wheel brakes are fitted. On the six-cylinder the brake drums are 16 inches in diameter and 2½ inches wide, this diameter being 2 inches greater than this year. On the four-cylinder models the brake efficiency has been increased by having the short levers and rods operating at more efficient angles. Fig. 8 shows the end of a brake rod R fitted with a yoke Y, which yoke is a stamping in place of a forging, as generally used. The expanding shoes in the Mitchell brakes are also stampings, by which construction the weight is reduced.

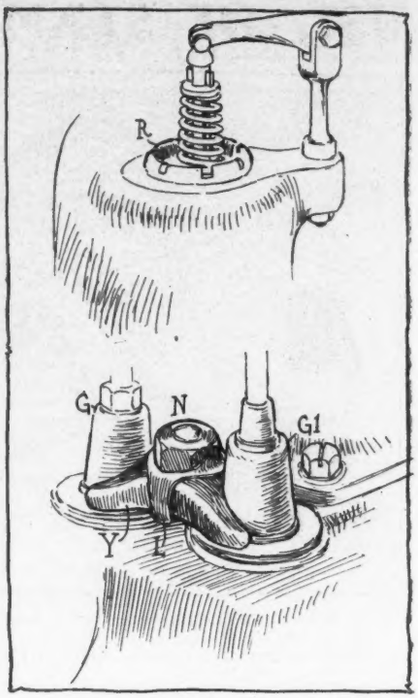


FIG. 6—THE EXHAUST VALVE CAGE IS ANCHORED BY A THREADED RING R, INSTEAD OF BY YOKE WITH TWO STUDS. A NEAT LOCK NUT DEVICE L IN THE FORM OF AN INVERTED U CLIP HOLDS THE NUT N IN PLACE

The company continues the use of a worm-and-gear steering mechanism, the full gear having the value over the sector of offering four new surfaces to the worm, should wear occur. As illustrated in Fig. 8, the shaft carrying the gear has a square ending S, over which fits the split end of the radius or ball arm A, a pinching bolt B binding it in place. On the bracket F are two stops K and K1, by which the amount of movement of the arm A is restricted, this preventing the tires wearing against the frame or fender by too much lock to the steering wheels.

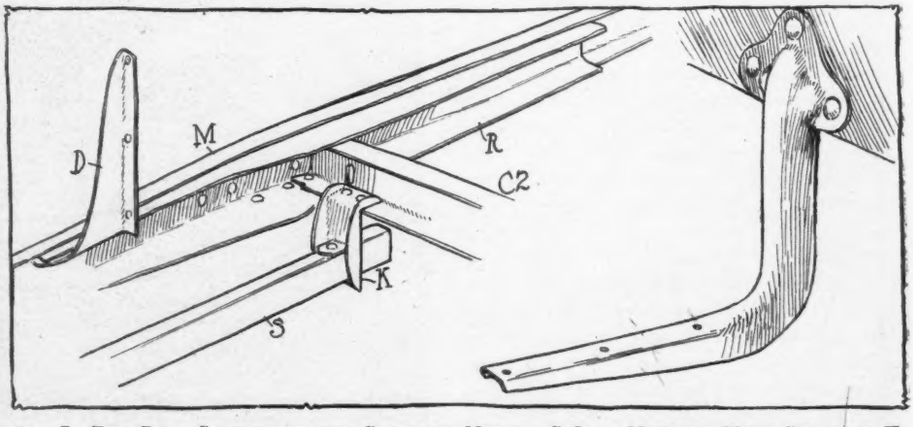


FIG. 7—THE REAR SUPPORT OF THE SUBFRAME MEMBER S IS A MITCHELL-MADE STAMPING K. THE FRAME AT ITS MID-SECTION IS REINFORCED BY A CHANNEL PIECE R. AT THE LOWER RIGHT IS A STAMPING USED TO SUPPORT THE RUNNING BOARD

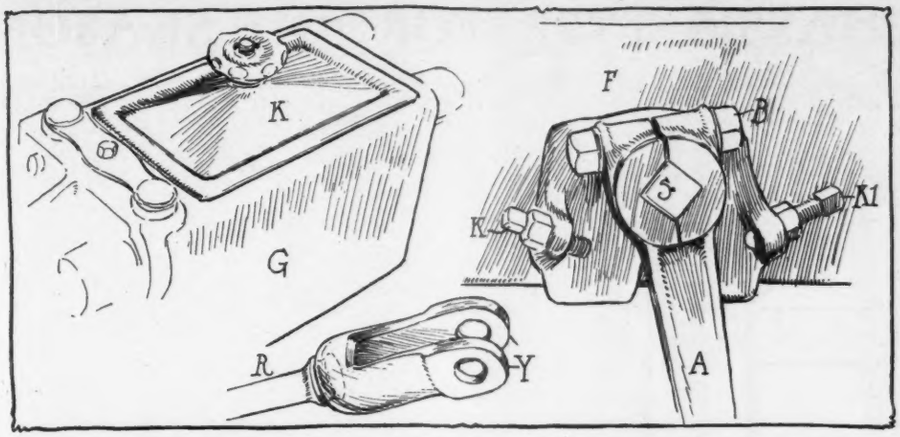


FIG. 8—THE GEARBOX G NOW HAS A STAMPED COVER K. EACH BRAKE ROD CARRIES A STAMPED YOKE Y. THE STOPS K AND K1 RESTRICT THE MOVEMENT OF THE BALL ARM A

The three Mitchell models are R, T and S, the first two being four cylinder models, the latter six. R is made as a three-passenger car, and also a surrey; T is a five-passenger car; and S is a seven-passenger machine. On all of these models the price has been raised for next year, this raise being due to an increased equipment provided. The wheelbases are 100, 115, and 130 inches, respectively. The tire sizes are 32 by 3½, 34 by 4, and 36 by 4½, respectively. This shows that on the T and S the sizes are ½-inch larger than this year. On the model T the circulating system on the motor is not used, but the system used this year is retained. It consists of a mechanical oiler carried on the right motor arm.

The general use of stampings in the Mitchell cars is undoubtedly one of its characteristics from a manufacturing point of view, stampings being used in over a score of the car parts. Some of these are: brackets supporting the dash, four fan blades, running boards, running board brackets, yoke ends for brake connecting rods, rear spring brackets, muffler is a stamping from end to end, cups and cones for all bearings, cone for the clutch, cover for gearbox, cover for bearing adjustment opening on torsion tube, bands for internal and external brakes, housing for universal joint, bracket for supporting rear end of the subframe, support and bearing for starting crank in front cross member of the frame, rubber bumpers for front springs, steering gear support, bonnet support on the front of dash, and crowfoot yokes for retaining the valve lifter guides. The main feature about a stamping is that it is lighter in weight, so that the car weight is reduced by its use. It is cheaper to manufacture than a forging, notwithstanding the fact that it has adequate strength.

All over the Mitchell chassis grease cups are used; these are seen at each side of the differential housing. Oil cups are used on the steering knuckles, on the ends of the tie rod between the knuckles.

MOTOR CAR LITERATURE

"Automobile Lighting by Electricity," issued by the engineering department of the Willard Storage Battery Co., Cleveland, O., deals with the system of wiring and offers many general and up-to-date suggestions for wiring, illustrated with several diagrams showing methods of wiring.

The Republic Rubber Co., Youngstown, O., has just issued a booklet entitled, "The Tire Perfect," drawing the attention of the public to its staggard tread tires and their quality and construction.

Charles E. Miller, New York, has issued his 1911 catalog of motor car accessories, consisting of 112 pages, which are bound within an attractive cover. Some of the articles listed are tires, bumpers, lamps, tire pumps, motors, chains, etc.

The Gus Balzer Co., New York, has mailed to the trade its 1911 catalog of accessories, including such articles as name plates, bouquet holders, radiator emblems, monograms, etc.

A Southern product, the Marathon car, is attractively illustrated and described in a catalog recently issued by the Southern Motor Works, Nashville, Tenn.

The White Co., Cleveland, O., has just issued an advance folder featuring its line of gasoline and steam cars for the 1911 season. It is also mailing a neat brochure detailing its town cars for fall and winter use.

The Westinghouse publicity department has just issued its 1911 diary. Besides the diary portion of the book there are pages for memoranda and traveling expense accounts and it contains in addition general information on Westinghouse products.

The 1911 Premier catalog, simple in its makeup and design, details the Premier models for the coming season. Nine full-page illustrations show the various types of the Six-60 and Four-40 models. The usual catalog specifications are included.

"Why the Marmon" is a dissertation on the Marmon cars profusely illustrated with reproductions of the many varied trophies the Marmon has won during the 1910 contest season.

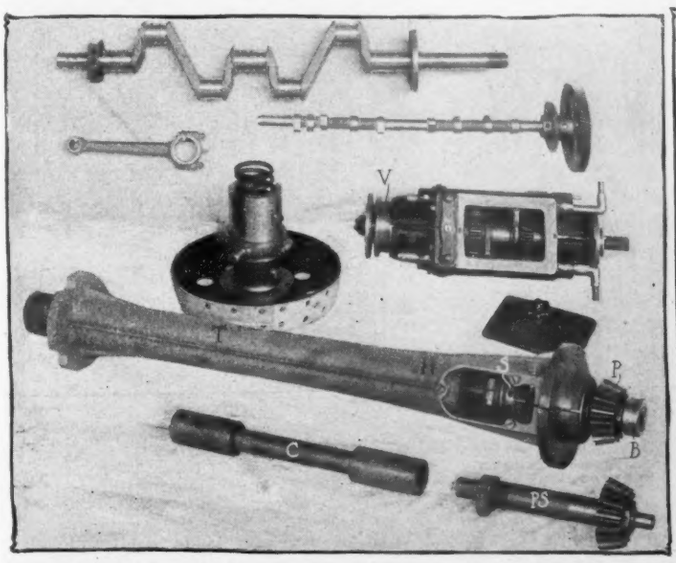


FIG. 9—THE CAST STEEL TORSION TUBE CARRIES THE THREE-PART PROPELLER SHAFT, THE CENTRAL PART C AND REAR PART PS BEING ILLUSTRATED. V SHOWS THE GEARBOX SUPPORT

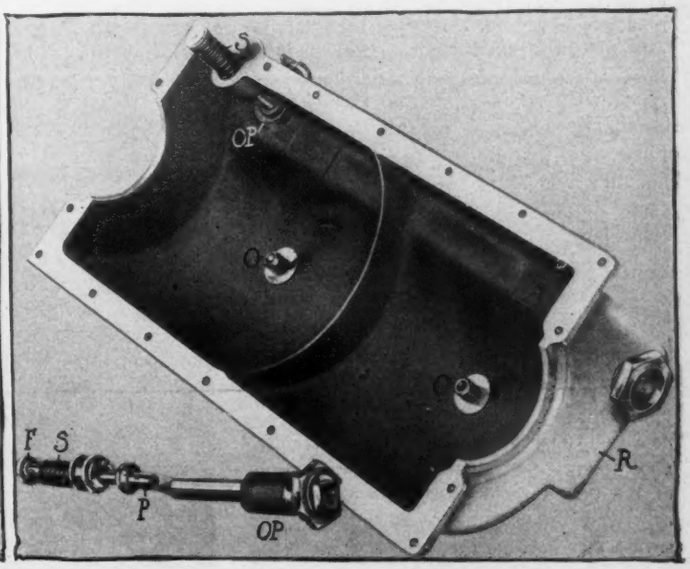


FIG. 10—MITCHELL CRANKCASE SHOWING OIL PUMP IN PLACE AND ALSO OUT OF CASE. THE OVERFLOW PIPES O ARE ADJUSTABLE IN HEIGHT TO VARY OIL LEVEL

ONE MOLINE CHASSIS TYPE FOR 1911 SEASON

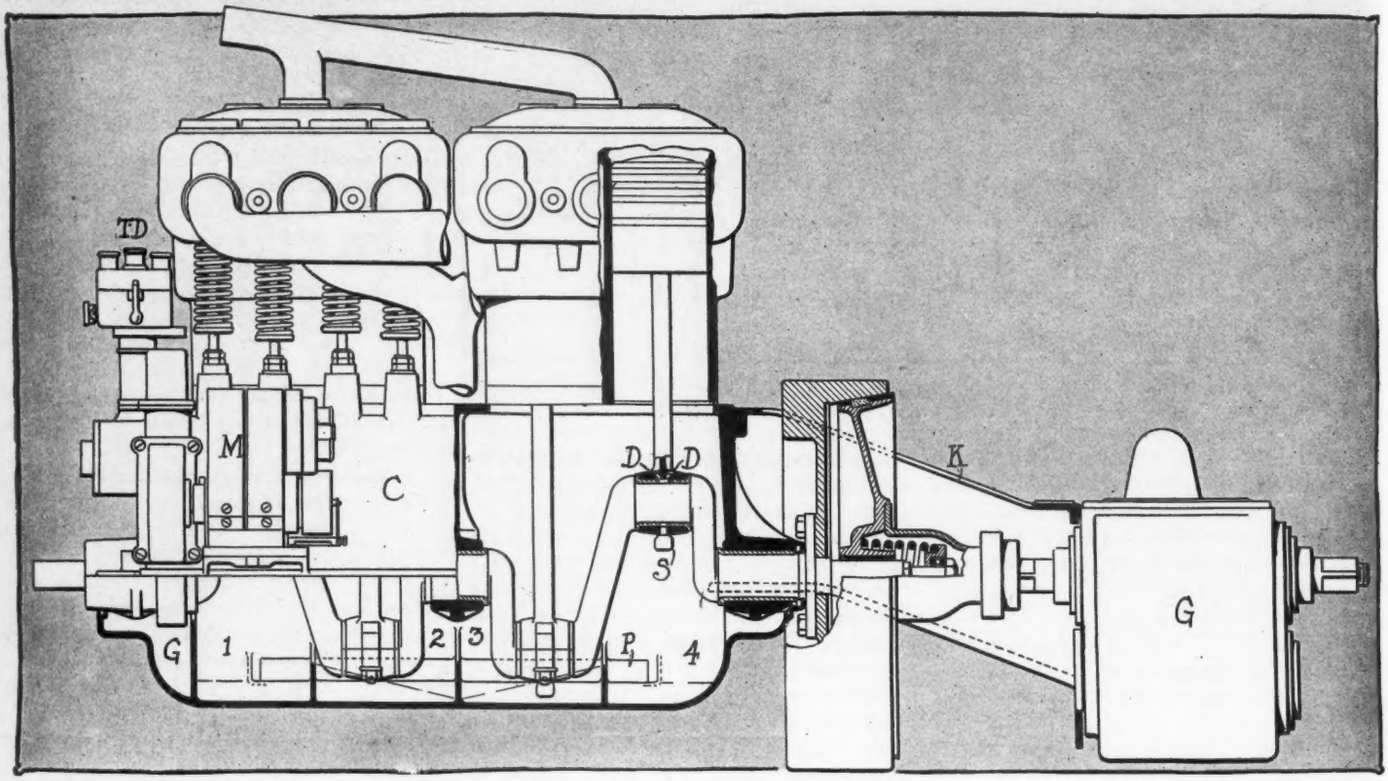


FIG. 1—UNIT POWER PLANT ON 1911 MOLINE CHASSIS

THERE has been much talk of the long-stroke motor during the past 6 months and while the French makers have been producing motors with a stroke twice the bore it is questionable if any other American maker has built a motor with the stroke one and one-half times the bore as the Moline Automobile Co. has done for next season. The Moline figures are bore 4 inches, stroke 6 inches. The stroke in 1910 models was 4½ inches. There have been 1½ inches added. Exactly what the status of the long-stroke in America will be cannot be foretold at this time, but the tendency is in that direction. Abroad, especially with the big continental builders, there is no mistaking the trend; it is long stroke with the possibility of them getting still longer. America is just beginning to know what the long stroke is. Many makers talk about their long strokes, but the facts are that a motor can scarcely be classed in this category until the stroke is at least 50 per cent in excess of the bore.

Naturally the first question asked regarding the long-stroke motor is its efficiency and what results will it give. The Moline people entered three, the first three ever built, of these motors in the 1910 Chicago trophy division of the Glidden tour, one of which won the trophy; and in the recent 1,000-mile reliability run of the Chicago Motor Club three of these cars were entered and two completed the severe test with perfect scores, there being only three cars out of a field of thirty-two to have perfect scores after the technical examination of the motor and chassis parts as well as brake and other final tests were made.

Several Chassis Changes

But the Moline company has made not a few other alterations in its product for next year. In the ignition system a double independent outfit with two sets of plugs has been adopted. One set is made up of a low-tension Splitdorf magneto M Fig. 7, the low-tension current from which is passed through a step-up coil carried in a wood box on the dash, thence to the magneto distributor and lastly through a vertical fibre tube T to one set of plugs. The magneto sits specially low and to give access to it and the carbureter a hinged door D is cut in the wood sill so that with it thrown back, as illustrated, there is ample opportunity to reach either part. The second ignition system takes current from a battery, passes it through a single-unit coil on the dash, carried within the same box as the magneto coil, and from this it goes through a timer-distributor TD carried on a short vertical shaft at the front end of the motor, and lastly through a horizontal fibre tube to the second set of spark plugs. Combined with the distributor is a primary breaker mechanism for interrupting the battery circuit on its way to the coil. Although not illustrated in Fig. 7 the high-tension cables from the timer-distributor are regularly encased in a leather tube which meets the front end of the fibre tube. This tube also carries the high-tension wire conveying the current from the coil to the distributing segment of the distributor.

The other Moline changes refer specially to alterations in the running gear, such as longer wheelbase, larger tires, dropped and offset frame, heavier frame side members, larger brakes and heavier front wheel bearings, all of which will be referred to in detail later.

A Home Made Motor

The Moline motor, in addition to it being a pioneer in the long-stroke, has other characteristics, all of which have been used for several seasons and have been well tested out and found to measure up to the desired status of the car. Figs. 3 and 7 give a general conception of it, employing as it does L-type of twin cylinder castings with the offset chambers housing the intake and exhaust valves placed on the left side. Since the inception of the four-cylinder type of motor the company has used thermo-syphon cooling, which it still adheres to. In this connection it is interesting to note that the recent reports of the Paris and Olympia expositions show that thermo-syphon cooling is gaining steadily so that it is now employed by many concerns on their largest models, whereas it used to be adopted on the smaller sizes only. Now every maker of small cars, with scarcely an exception,

uses it and it is constantly gaining in the largest sizes of motors. The external evidence of the Moline cooling system is confined to two pipes W and WI, Fig. 3. The water enters the jacket from the radiator base through the aluminum intake WI and leaving the tops of the jackets passes to the radiator through the return aluminum pipe W. Neither of these pipes is of that mammoth diameter so often associated with thermo-syphon cooling. Each pipe has an internal diameter of 1⅜ inches where it joins with the waterjacket. In the thermo-syphon cooling the radiator must bear a definite relation to the cylinder jackets, otherwise the flow of water would not be maintained. In the Moline the base of the cylinder jacket is 8 inches higher than the bottom of the radiator and the top of the waterjacket is 5 inches lower than where it enters the radiator. The top of the vertical-tube radiator is a water tank in which the water supply should be kept above the mouth of the return pipe W.

Thermo-Syphon Cooling

Although thermo-syphon water circulation is used the waterjacket spaces are not over large and the casting consequently little if any heavier than those used in pump circulation. Fig. 2 shows a side view of a twin casting and also an end section. There is over the cylinder head a large volume of water in the space J as well as good sized jacket spaces JI entirely surrounding the cylinder walls, excepting at J2, which is a slightly smaller space between the bores of the adjacent cylinders. Each valve guide S is liberally cooled with an extra wide jacket space J3 on the cylinder side and the space J5 on the outer side. Each valve seat is entirely waterjacketed, a section of the jacket space appearing at J4. These cylinder

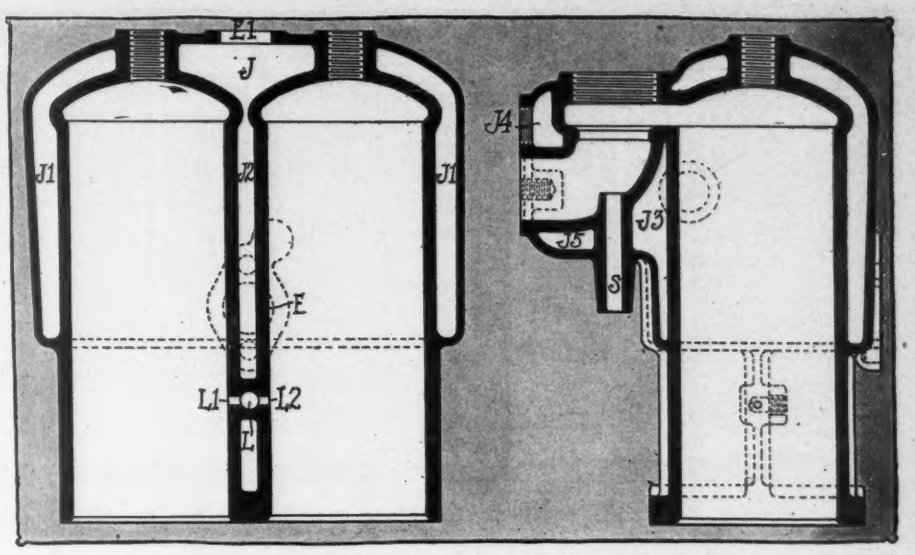


FIG. 2—MOLINE CYLINDER CASTING SHOWING WATERJACKETS

castings are made by the Moline company in its own foundry, which is and has been for many years a permanent unit of its gas engine plant, the company building stationary gas engines for over a decade. Additional cooling is obtained by a belt-driven fan in rear of the radiator.

Unit Power Plant

A third Moline characteristic is the unit construction of the motor, cone clutch and selective gearset as well as carrying these three on a three-point suspension, a design followed for many years by the company. Its details are shown in the part section seen in Fig. 1. The unit feature is an aluminum link K which bolts to the cast iron crankcase at one end and carries the aluminum gearbox at the other. This link is a one-piece aluminum part with its two arms circling the flywheel and held to the motor by seven bolts. This connecting link is considerably dropped towards the rear in order to bring the gearbox as low as possible and so reduce the angularity of drive through the propeller shaft. The three points of suspension are best seen in Fig. 4 on a following page, where the frame illustration shows the forward trunnion support at B1. At this point a bracket is riveted to the frame cross member. The design of this bracket as seen from the rear is illustrated at B2 and its shape as seen from the left side is exaggerated at B3. The motor hangs on this bracket through a pin which is babbitted, thereby presenting a wearing surface and allowing for a rotary movement of the power plant so as to avoid strains in the chassis being transmitted to the crankshaft. The two rear points of support are on a cross member amidship and just at the point of offset of the side members of the frame, at which point the large gusset plate G is introduced to stiffen the construction. The two points of support are direct on this cross piece, the two sets of bolt holes showing the points of support. Here is a case where neither the motor nor gearset is hung direct on the side frame members.

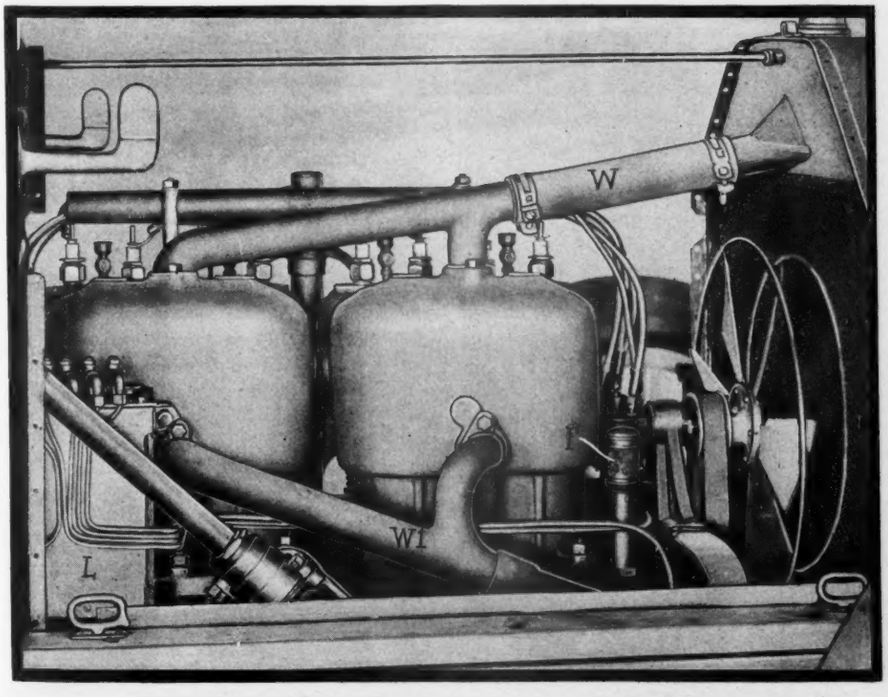


FIG. 3—MOLINE THERMO-SYPHON COOLING SYSTEM

Uses Mechanical Oiler

There is still another Moline motor detail to be referred to before leaving it, and that is the mechanical oiling system. Although the many companies are adopting the circulating oiling system, the Moline company has continued for 5 years the use of a Hill mechanical oiler L Fig. 3, with its five leads, two going to the cylinder walls, one to each casting, two to the main crankshaft bearings and one to the timing gears. With this oiling system a supply of fresh oil is sent direct to each bearing. In Fig. 6 more lubrication details are illustrated, the lower part of the illustration showing the four compartments 1, 2, 3 and 4 into which the base of the case is divided, there being one for each connecting rod. In climbing long hills there is a danger of more oil getting to the back cyl-

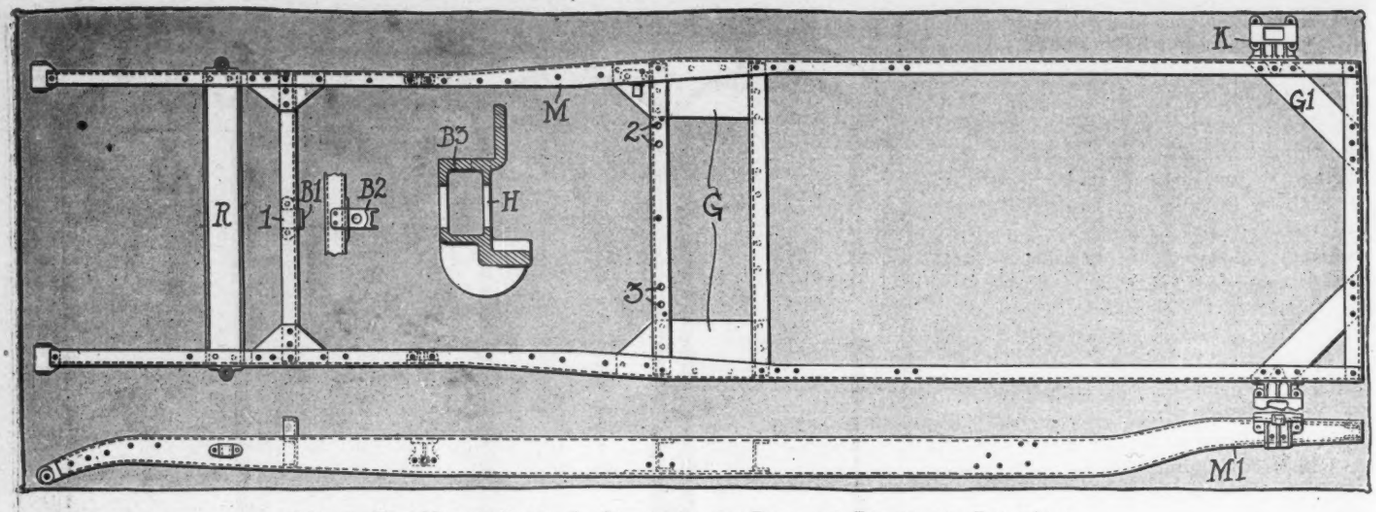


FIG. 4—THE MOLINE FRAME IS OFFSET AT THE DASH AND DROPPED AT REAR AXLE

inder than to the front ones because of the rear part of the case being lower, but to assure an even distribution as soon as the top of the hill is reached an equalizer pipe P is cast integrally along the base of the case and this has an opening A to each crankcase compartment so that, within a second or so after the level road has been reached, the same quantity of oil is beneath each connecting rod and so an even splash given to all four cylinders. This equalizer pipe has an internal diameter of ¾ inch and a section of it is shown in the upper half of the illustration. The outlets to this pipe are at the forward side of each compartment, so that there is always a certain oil level in each.

There is one more crankcase detail shown in Fig. 6, this being a compartment G in which the timing gears are carried instead of the case being formed with a separate compartment for them. This compartment is constituted by a high partition and as the oiler directs a special stream of lubricant onto these gears the supply is always insured. The lower part of the case extends forward with a compartment K1 beneath the starting crank. This forms bearings for the crank and prevents oil leakage.

Quiet Timing Gears

Practically every detail of the Moline motor is manufactured at the factory and some characteristic constructions are used. One aim has been to have quiet timing gears, the gear on the crankshaft and also that on the camshaft being gray iron with spur teeth. As the crankshaft bearings are scraped differently in each motor it is certain that the distance between the center of the crankshaft bearing and the center of the camshaft bearing is different in every car. This will result in noisy timing gears because the mesh is not right. To avoid such an eccentric camshaft bushing Fig. 5 is used at each end in which the hub part H is 10 one-thousandths (.001 inch) eccentric to the flange part F. In the flange is a circle of eight holes, only three of which are used at any time to anchor the bushing in place so that, after the motor is assembled, it is run and the noise of the gears noted. If too noisy, this bushing is turned so as to bring another set of three holes into use and by one-eighth revolution of this bushing .00125 inch increase or decrease can be made in the pitch radii of the gears and so noise eliminated. By using a gray iron upper part in the crankcase the use of bronze bushings for the valve tappets is eliminated. The tappets are made specially large, $\frac{15}{16}$ inch in diameter. On the lower end is the usual roller that is carried by a hardened pin which is secured by riveting the hole in the roller over the pin ends. The tappet is kept from turning by milling a vertical keyway in one side and threading into the guide a screw with a square end, which end rests in the keyway. When the square-end screw is being threaded into place the tappet is lifted so that the bottom of the keyway clears the screw, and as soon as the screw is into place the tappet is lowered. It is solely by this construction that a squared-end screw, which holds the tappet firmly, can be used.

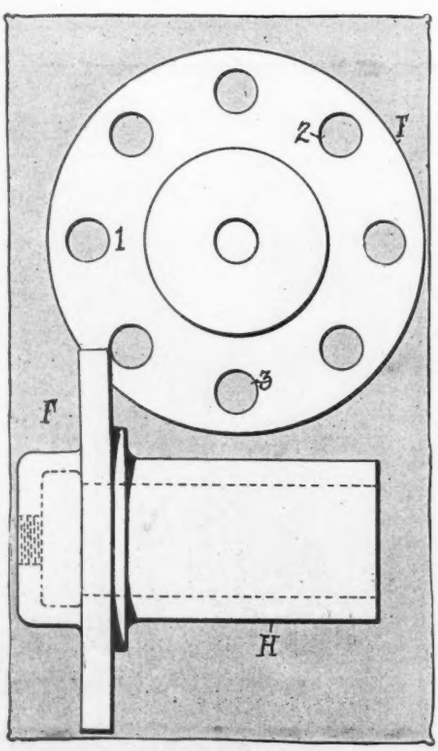


FIG. 5—ECCENTRIC CAMSHAFT BUSHING

Balancing the Crankshaft

Special care is shown in the crankshaft of the motor. These shafts are forgings which are purchased in the rough, and after being turned to size are ground on all bearing surfaces and then balanced. In balancing a crankshaft it is customary to place it on two level supports and then place it with the cranks at any angle, and if it remains it is in balance; but should it go through a fraction of a rotation then it is not balanced. This is known as the static balance; but it is a scientific fact that a shaft in static balance may not be in rotary balance, as is proven by a special crankshaft balancing machine known as the Norton rotating balancing machine, brought out during the present season to overcome the difficulty of depending only on static balance. On this machine the crankshaft is carried at each end on a set of four hardened rollers, these rollers being in turn supported on a bracket carried in a floating bushing. To each floating bushing is attached a long pointer or needle so that when the crankshaft is rotating at speed, if it is not balanced it will cause a side movement of the floating bushing at the front end or at the rear end or both, and the needle tells of this condition. A crankshaft is put on for a preliminary test and the needle vibration for both ends noted. Lampblack is then applied by roller to a part of each bearing and the pointed end of an indicator brought into contact with the blackened part while the shaft is in rotation. This pointer indicates in the blackened surface the side on which the extra weight is carried. The shaft is removed and a part taken off on a grinding machine. With one or two trials, sometimes three or more, the shaft is put into perfect rotary balance. Each shaft in the 1,200 machines for next year is being balanced in this way.

The flywheel is similarly balanced; so

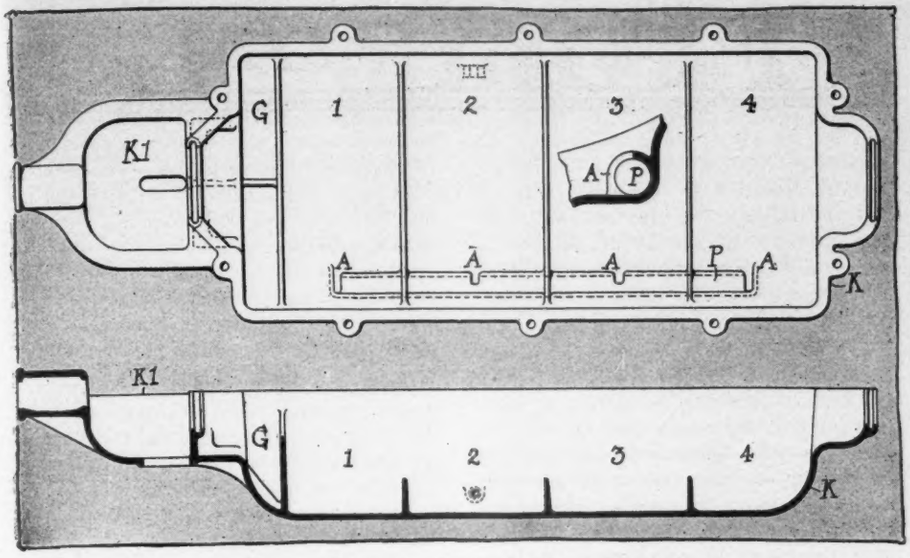


FIG. 6—CRANKCASE SHOWING OILING SYSTEM

is the cone member of the clutch after its leather facing is riveted in place and its grease cup fitted. Each piston is brought to an accurate weight and the rings are also balanced so that when the total reciprocating and rotating masses are assembled they are balanced. Making each piston of a definite weight, and doing the same with the connecting rods, piston rings, wrist pins, etc., is preferred in the factory to balancing each set by itself. Where each set is balanced by itself the entire balance is upset should a new piston or connecting rod have to be used; but where each unit in the entire year's output is balanced originally to a definite weight the balance of the motor is not upset when a new one has to be added at any time.

The crankshaft is carried on three die-cast babbit bearings, all bushing being pinned in place. The shaft has a total bearing length of 9¼ inches, distributed as follows: 3¼ inches at the front end, the same at the rear, and 2¾ inches in the center. Each bearing is 1¾ inches in diameter and the crank pins are the same diameter. The camshaft formed with integral ground cams is carried on three bearings.

Grinding the Valves

The valves governing the intake and exhaust have nickel steel heads which are electrically welded to the mild steel stems. All of the valve seats are ground to fit before being assembled in the motor. This grinding is done on a special machine in which the valves are given from four to six revolutions in one direction and are then lifted from their seats by a cam action beneath the bottom of the stem and given an equal number of rotations in the opposite direction. This process is continued and the surfaces inspected by cleaning with gasoline and then applying lampblack, to ascertain if the surface is accurat e .The valves are made with an external diameter of 2⅛ inches and the valve opening in the cylinder casting 1 1/16 inches.

In the manufacture of the pistons and cylinders the grinding process is used as a final stage. Each cylinder casting goes through three operations: First comes the rough boring cut, which is followed by a sizing operation, and finally comes the grinding with a Herald eccentric grinder. A limit of .001 inch is allowed in the grinding process. The pistons are also ground. In their manufacture the limit distance between the piston and cylinder varies. Between the upper ring and the top of the piston the piston is made 1/64 under size to allow for expansion. Between the second and third rings it is .010 under size. Beneath the second and third ring it is .008, and at the bottom it is .005-inch under size. The hollow wristpin is 1 1/16 inch in diameter and is secured to the piston by a Woodworth key. The pin is case hardened, 1/16 inches deep and ground to finish.

In the running gear one of the leading changes is the improved frame construction, as illustrated in Fig. 4. It will be noted that the side members are now offset at the dash where the enforcing gusset G is fitted and there is also a 2½-inch drop in front of the rear axle. Heretofore the Moline frame side members have been straight from end to end and the body has overhung, but now rests upon them. These side members are of channel section 4 inches in vertical depth and made from 3/16-inch stock. Lengthening the wheelbase from 112 to 117 inches has added to the length of the side members.

The transmission system employed consists of a three-speed selective gearset with both shafts carried on short-series Timken bearings. Shafts and gears are made from 31 nickel steel. The set is a Brown-Lipe design. The combined rear axle and torsion tube is a Weston-Mott. In this axle the differential is carried on Hyatt roller bearings, the pinion shaft is supported on a race of New Departure bearings immediately in front of the pinion. The brakes have been increased in size, the drums now measuring 13½ and 14 inches internal and external diameter and being 2 inches wide. This is an increase of 2 inches over the present design. The diameter of the tires has been increased from 34 by 3½ to 36 by 3½. The Moline spring suspension is made up of semi elliptics in front and elliptics in rear, the latter anchoring to the frame through steel castings. The front axle is an I-beam forging with the wheels carried on cup-and-cone ball bearings, ⅝ and ¾-inch balls being used. Only one universal joint is used and that is located immediately in rear of the gearbox.

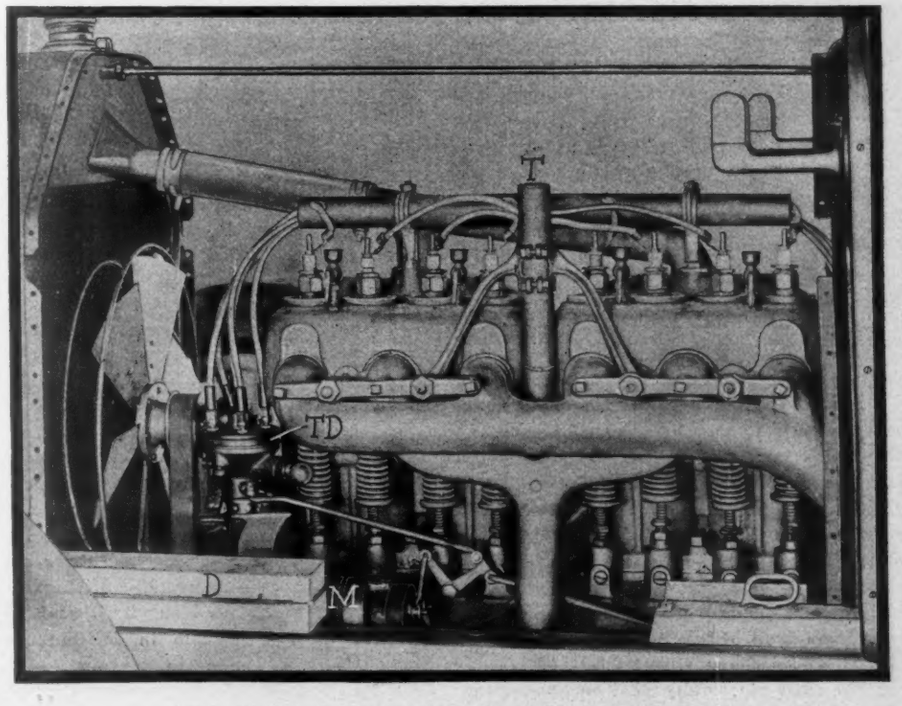


FIG. 7—MOLINE MOTOR WITH DOUBLE IGNITION SYSTEM

From the

BULL Dog in Florida—With a mileage of 20,000 miles behind them and experiences that seldom fall to the average men in a lifetime, and having traveled through thirty-five states and two territories by car, the crew of the battered Abbott-Detroit Bull-Dog rested in Jacksonville, Fla., over Christmas.

Women Talk Good Roads—Undoubtedly the first good roads meeting ever held in the United States by women and for women was addressed by Judge J. T. Ronald, president of the Pacific Highway Association, at the monthly meeting of the Tacoma Business Women's League in the Commercial Club's headquarters of the City of Destiny. This meeting, and the interest the women of the state of Washington are taking in the good roads movement, undoubtedly follows the constitutional amendment which was favorably voted upon giving equal suffrage.

Toll Roads Closed—The thousands of daily users of the highways between Baltimore and Boonsboro received a substantial Christmas gift from the state good roads commission when the tollgates on the Frederick road between those two points were closed. The deal for the purchase of the turnpike, which involved an outlay of $100,000, has finally been consummated. When the transfer was made Governor Crothers ordered the collection of tolls to cease. The road is 61 miles long and passes through Baltimore, Howard, Carroll, Montgomery, Frederick and Washington counties, and on it are ten tollgates.

Wisconsin Meetings—A number of important meetings will be held in Milwaukee, Wis., during the third annual motor show in the Auditorium, January 14 to 20. The Wisconsin State Automobile Association will hold its semi-annual or winter meeting and the Wisconsin Retail Automobile Dealers' Association will hold its first annual meeting. The show will open on Saturday evening and close on the following Friday evening. In this way a good Sunday patronage will be created, attracting good crowds before the novelty of the show has been worn off by 5 or 6 days of display.

Money for Roads—The Sioux City Automobile Club, of Sioux City, Ia., at a recent meeting, went on record as favoring legislation to turn the money received from motor car licenses into the good-road fund. This action was taken after a report from A. E. Nissen, and H. Huebinger, of Des Moines, on the Hawkeye highway, the men having just arrived in Sioux City over this highway. The idea is to have the money go into the road fund of the counties where it is received, instead of into the state treasury. The Sioux City club was the first Iowa club to advocate this. The club also favored as the official sign, a large "H", the words "Hawkeye Highway" on both of the upright bars of the letter, and "Sioux City to Des Moines" on the cross bar. These will be printed in white on blue enameled sheet iron signs, and will be posted along the route of the highway. Bad roads and hilly country will be indicated by red signs with the official insignia. The club intends to purchase several King road drags, and use them on the roads leading into Sioux City. Their use along the route was strongly recommended.

British Columbia's Record—The present government of British Columbia, headed by Richard McBride, is making a record in road building which, taking into consideration the population of the province, is probably second to none. With an estimated population of a little over 300,000, the British Columbia government will expend something like $4,500,000 this year in the building of roads. All this money is drawn from the treasury and is not specially levied for any one period.

Invents Motor Sleigh—Sleigh riding in a motor car is the latest fad in Kalamazoo, Mich. Thomas H. Midgely originated the idea in Kalamazoo. Mr. Midgley had his Cartercar equipped with runners on the front wheels. The wheels ride stationary on the pneumatic tires. The runners are slid along the snow by the power of the rear wheels. The rear wheels, serving as drive wheels, carry the regulation anti-skid chains and the machine runs very well.

Will Educate Public—The Citizens' Business League of Milwaukee, Wis., has promised to undertake a campaign of education in Milwaukee county on the highway improvement question, with special reference to dragging of roads. The league now is pushing an educational campaign in other parts of the state. Secretary Francis A. Cannon, speaking before the county board of supervisors, said that only $4,000 would be necessary to drag all roads in Milwaukee county at least once and possibly twice, following which township officials and farmers would doubtless recognize the advantages and do the work themselves.

Boom Lake Shore Drive—The Milwaukee lake shore drive, a comprehensive project of long standing, has been given renewed impetus by the action of the Milwaukee common council in preparing a bill to be presented to the legislature, granting the city permission to fill in sufficient land along the shores of Milwaukee bay for the purpose of constructing a continuous highway from the southern to the northern boundary. This drive was projected several years ago, the idea being to ultimately connect with the famous Sheridan drive in Chicago and suburbs along Lake Michigan. Links in the chain are being built at Racine and Kenosha, while in Milwaukee nearly 3 miles have been completed. Near the business district, where a railway has pre-empted the entire lake shore, a new shoreline will be built, connected at the various street terminals with elevated roadways. The land to be filled in will be 600 feet wide and will contain a roadbed with parkways. The legislature is asked to allow the city to impose a one-fifth mill tax, amounting to $50,000 a year. It is believed that the drive will then be completed in 5 years.

Death of W. B. Stover—William B. Stover, superintendent of construction of the Studebaker Brothers Mfg. Co., died at his home in South Bend, Ind., December 21, after an illness confining him to his home for the last 3 months. Death was due to valvular heart trouble. Mr. Stover had been connected with the Studebaker company for a number of years and had made several trips abroad for the company, visiting countries of Europe, Africa, Australia, Japan and China.

Wolverine at Syracuse—Bound from Detroit to New York the Warren-Detroit Wolverine arrived in Syracuse Tuesday night after a hard run from Rochester. The car bounded over the state highways in great shape, only encountering difficulty in the famous Montezuma swamp. The striking of a bad drift during the day served to put two tires out of commission, one being badly cut while the midwinter

The Show Circuit

December 12-31—Two weeks' show of Los Angeles Motor Car Dealers' Association, Los Angeles, Cal.
December 31-January 7—Grand Central Palace show, New York.
January 2-7—Importers' show, Hotel Astor, New York.
January 7-14—First week of A. L. A. M. show in Madison Square garden, New York.
January 14-25—Show in Brussels, Belgium.
January 14-28—Show of Philadelphia Automobile Dealers' Association, Philadelphia, Pa.
January 16-21—Second week of A. L. A. M. show in Madison Square garden, New York.
January 16-21—Show in Wayne pavilion, Detroit.
January 14-18—Show at Milwaukee, Wis.
January 25-28—Show in Auditorium, St. Paul, Minn.
January 27-February 4—Show at Vancouver, B. C.
January 28-February 4—First week of national show in Coliseum, Chicago.
February 5-11 Show at Buffalo, N. Y.
February 6-11—Second week of national show in Coliseum, Chicago.
February 13-18—Show at Winnipeg, Canada.
February 13-18—Show of Kansas City Motor Car Trade Association.
February 13-18—Show at St. Louis, Mo.
February 13-18—Show in Convention hall, Washington, D. C.
February 14-19—Show at Dayton, O.
February 15-18—Show at Grand Rapids, Mich.
February 18-25—Show at Minneapolis, Minn.
February 18-25—Show at Binghamton, N. Y.

Four Winds

tourists were chopping frozen snow away from the rear wheels. The tourists have set a schedule which will get them in New York by Friday night, making the time for the trip 10 days.

Club in Oregon—Owners of Benton County, Ore., recently organized at Corvallis, Ore., the Benton County Automobile Club and elected the following officers: President, Walter H. Kline; first vice-president, Grover Avery, second vice-president, Mark A. Rickard; secretary, Floyd Bogue; treasurer, Z. H. Davis. Its founders have for their objects the promotion and improvement of highways, proper maintenance and proper marking of roads, and the supervision of just and rational legislation.

Count in Wisconsin—The biennial report of the secretary of state of Wisconsin issued early this week by Secretary James A. Frear shows that up to December 1, 1910, just 13,753 motor car licenses had been issued during the past year. While the highest number issued at the end of the period was 15,950, the actual number of cars in use by private owners is 13,753. Wisconsin licenses are perennial, but cover only the certain car and the owner thereof for which application for license is made. When the car is sold the purchaser must procure a new license, and the former owner, on buying a new car, must do likewise. In this way there is a discrepancy between the number of licenses issued and the total actually in force. The growth of the use of the motor vehicle in Wisconsin is best illustrated by the figures given in the report. During 1907 a total of 3,558 licenses was issued; during 1908 a total of 5,271; in 1909, 8,227, and in 1910, 13,753.

Judge Would Be Strict—Discussing the ordinance recently passed in Milwaukee, Wis., making it a penal offense for a driver of a motor vehicle to fail to stop after striking or injuring a person, Judge Orren T. Williams, of the Milwaukee circuit court, said: "That is like locking the stable after the horse is stolen, or signing a pardon after the hanging. Pass an ordinance that will make it prima facie evidence of a crime, or of wanton negligence, if it is shown that any person on the street has been run into by a motor car or any other vehicle."

Would Consolidate—At a recent meeting of the Grand Rapids Automobile Club, of Grand Rapids, Mich., President Alvah Brown announced that he would appoint a committee of five to confer with the directors of the Grand Rapids Curling and the Highland Golf clubs regarding a consolidation with the motor club, through which a big new clubhouse would be built and an organization formed which will have a membership greater than any of the kind in the state of Michigan, outside of Detroit. The suggestion was made by members of the motor club, as well as the other two organizations named, it being stated by them that the Highland Golf Club is anxious to secure new quarters, and the curling club is in a receptive mood for such a proposition. One of the plans discussed was the proposed purchase of the Lakeside club house, which, in the event of the deal going through, would be removed onto the site of the Masonic home building, which was burned this year.

Moline Organizes—As a result of agitation in favor of good roads and protest against the wheel-tax ordinance, thirty owners of Moline have formed a temporary club. Officers elected were: President, A. G. Amraham; secretary, J. H. Bushong; treasurer, M. J. Horstkamp.

Help Santa Claus—Following their usual custom, motor car companies of Indianapolis assisted the newspapers in making their annual distribution of Christmas charity. The Indianapolis Star, through a fund raised by subscription, sent out packages of candy, toys, etc., to about 1,400 families, while the Indianapolis News gave several hundred baskets containing Christmas dinners. Thirty trucks and touring cars were furnished to aid the Star in its delivery work. The Premier company loaned twelve cars to deliver the News's baskets.

Error in Ohio Law—Attention has been called to an unauthorized change made in the Ohio motor law by the state codifiers about a year ago which is of great importance to motorists in the Buckeye State. As the law was originally enacted and as it stood prior to the codification of the state's laws, there was a provision that when a motorist scared a horse on the highways or otherwise caused interference with the use of the road by horse-drawn vehicles, the driver of the car must stop. This provision was omitted, and its omission was not discovered until a case was called in the Cleveland police court recently, where the accused was charged with failure to stop, and his attorney plead the offense not a crime or misdemeanor under Ohio laws. The accused was discharged. As the law stands now, the driver of the horse-drawn vehicle must call upon the chauffeur of the motor car to stop, and if he does not, no stop need to be made.

For This Winter

February 18-25—Show at Brooklyn, N. Y.
February 18-25—Show at Newark, N. J.
February 20-25—Show at Omaha, Neb.
February 20-25—Show at Cincinnati, O.
February 20-25—Show at Baltimore, Md.
February 24-27—Show at New Orleans, La.
February 25-March 4—Show at Toronto, Canada.
February 27-March 4—Show of Kansas City Automobile Dealers' Association, Kansas City, Mo.
February 27-March 4—Show at Sioux City, Ia.
March 4-11—Show at Boston, Mass.
March 6-11—Show at Des Moines, Ia.
March 13-18—Show at Cedar Rapids, Ia.
March 13-18 Show of Cleveland Automobile Dealers' and Makers' Association, Cleveland, O.
March 14-18—Show at Syracuse, N. Y.
March 14-18—Show in Auditorium, Denver, Colo.
March 15-18—Show at Louisville, Ky.
March 18-25—Show in Pittsburg, Pa.
March 25-April 1—Show of Pittsburg Automobile Dealers' Association,
March 27-31—Show of Cleveland Automobile Show Co., Cleveland, O. Pittsburg, Pa.
April 1-8—Show at Montreal, Quebec.
April 4-8—Commercial Car Automobile Dealers' Association show of Pittsburg, Pa.

WOLVERINE STARTING FROM DETROIT FOR NEW YORK

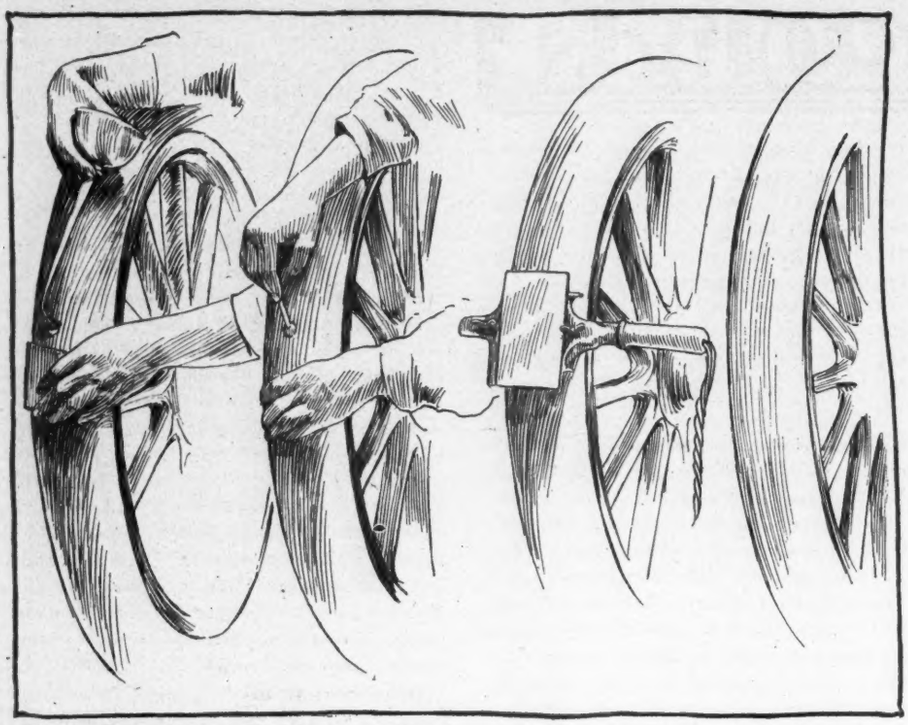


FIG. 1—VULCANIZING A TIRE—1, CLEAN HOLE WITH GASOLINE AND SANDPAPER; 2—FILL WITH RUBBER; 3—APPLY THE VULCANIZER; 4—THE PERFECT TREAD IN THE END

H. L. Towle's Ideas on

ELIMINATING what may be called violent deaths, namely, destruction by wrenching bodily off the rim on turns or by gashing on sharp stones and the like, the life of a tire is limited by four things: First, simple wear of tread, namely, in a race; two, rim cuts; three, internal cracking of the side walls of the fabric, due to bending; fourth, rotting of fabric, due to moisture entering through cuts in the tread and resulting in blow-outs.

With racing conditions we are not here concerned. Nevertheless, a car in constant and heavy service may wear out its tires faster than rotting ordinarily would destroy them. When this is the case the selection and treatment of the tires will differ materially from what they would be if rotting were a factor.

Rim-Cut Troubles

Rim cuts usually are due either to careless driving or to over-loading or slack pressure. The fabric seldom gives way at once, but its fibers are more or less crushed under the impact, and with the bending due to use they presently disintegrate and the tire bursts. Obviously the larger the tire for its load, the safer it is from rim cuts, and at the same time the less will be the pressure required to make it hold its shape. Incidentally, the larger the tire the larger will be the flattened area in contact with the ground and the less per square inch will be the contact pressure. A large tire inflated sufficiently, but not over-inflated, therefore will suffer less from punctures and stone cuts in its tread than a small tire under the same load. These considerations, among others, indicate why a large tire, meaning thereby one of large cross section, lasts longer than a small one. Large diameter presumably helps also, partly because each individual point on the surface of the tire comes less frequently into contact with the ground and therefore suffers less wear. Again, since the large wheel rides more easily over bumps and hollows than the small one, the impact on striking a bump will be less severe, and the resultant momentary flattening will likewise be less.

Rim cuts are not the only form of damage due to under-inflation. The bending due to motion progressively weakens the side walls of the fabric, particularly at points A and B, Fig. 2. To avoid this so far as possible is the object of the high air pressures recommended by tire makers. In a word, the tire should stand up round under its normal load. As above noted, the actual pressure required to accomplish this will vary inversely as the cross section of the tire, assuming the same load in all cases. Obviously, since the fabric weakens in service anyway, and with a given deterioration is more apt to burst under high than under low pressure, it follows that the larger tire, requiring less pressure to make it hold its shape, will last longer.

Fabric cracks at A and B are impossible to repair. The inner tube will be forced by air pressure into the cracks B and will be cut as though bitten. Consequently, before sending a tire to be repaired it should be examined carefully for signs of cracks as well as for rim cuts.

Whether a tire inflated sufficiently to prevent rim cuts will come to its final end through fabric cracks or through rotting will depend largely on how the tire is made. Probably more tires give out from rotting than from cracking. If cracking is absent and the fabric has not deteriorated from rotting when the first tread is worn through, a second tread is likely to be worth while. Different tires, however, differ greatly in their behavior. The writer has worn out three treads, extending over a period of three seasons, on tires of a certain make, and only forebore applying a fourth tread because the fabric had lost its ability to hold the rubber against peeling. As a general statement, retreading is worth while only when the fabric shows no visible signs of deterioration. A casing which has blown out, whether from a rim cut, a fabric crack or rotting, is seldom physically practicable to repair, and the job never is worth doing.

Rotting to Be Avoided

Rotting of the fabric is the worst enemy of the tire user. Take any tire that has run 2,000 miles off the rim and squeeze it. The tread will open into a thousand tiny cuts and gashes, most of which, if you are a novice, you did not even suspect existed. These cuts are the inevitable penalty of driving on the loose broken stone of half-repaired macadam roads. When the tire is new they seldom penetrate to the fabric. By the time the tread is worn half through, however, the fabric has been reached in scores of places, and at every puddle water enters to do its hidden mischief. But rotting takes time, and if the car is used continuously the tread may be worn through before rotting has made much progress. The less the car is driven the more important rotting becomes. Were a half-worn tire covered with stone cuts to be driven only a few hundred miles per year, it would inevitably end its career by bursting from internal decay.

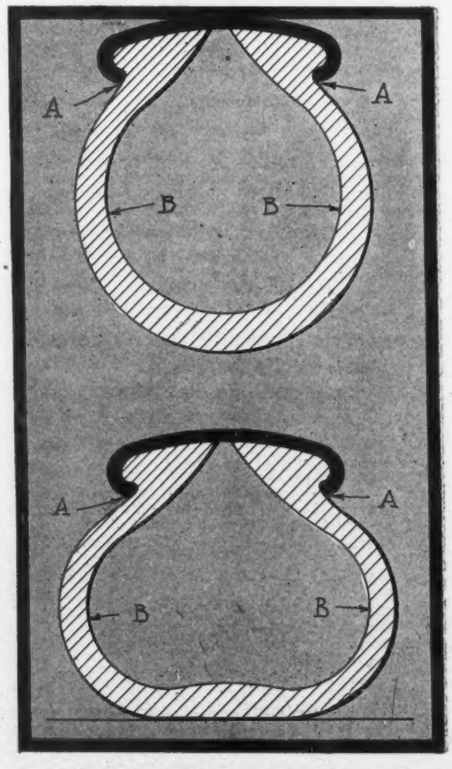


FIG. 2—ILLUSTRATING TIRE TROUBLE

Keeping Tires In Order

So numerous are the stone cuts when a car is driven on macadam roads that it is seldom worth while to attempt local repairs, save in the case of deep cuts and gashes incurred when the tire is comparatively new. The owner either must sacrifice the last portion of the tread while it still is serviceable so far as abrasive wear is concerned and pay for a new tread to protect the fabric, or he must accept the situation and merely run the tire until it bursts, hoping that it will burst later instead of sooner. When it does burst it usually is worthless for the reason that it is nearly ready to burst at several other points.

Disagreeable Alternatives

Which of these disagreeable alternatives is to be preferred will depend somewhat on how the tire is made. In some the breaker strip, namely, the first narrow strip of fabric between the tread and the fabric carcass proper, is of peculiar construction which holds the tread very tightly. In these tires a local cut reaching the breaker strip is likely to remain local, and the tread often may be worn right through before being renewed. If, however, the tread separates easily from the breaker strip, the rubber edges of the cut will act like lips to pick up morsels of dust or sand, which will work into the bottom of the cut and there grind and erode rubber and fabric till the two are forced apart. This is the beginning of the sand blister. Once begun, it grows with alarming rapidity till the owner may discover on removing the tire that what looked like a small lump in reality involves an area as large as his hand. Nearly every blow-out in the tread not due to a conspicuous gash may be traced to the slow decay around a sand blister.

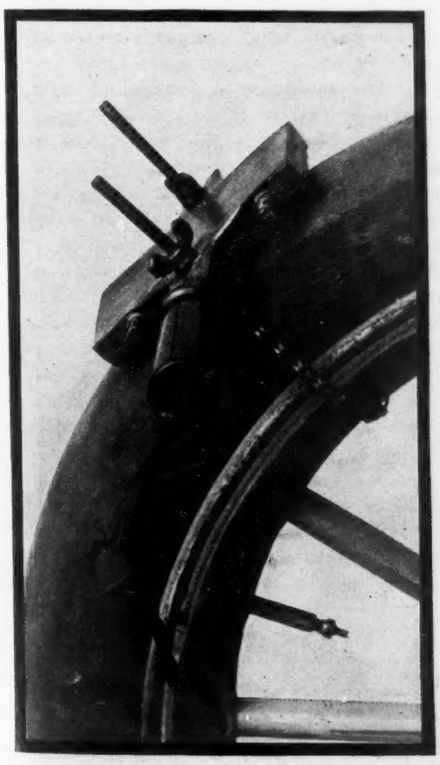


FIG. 3—USING TIRE VULCANIZER

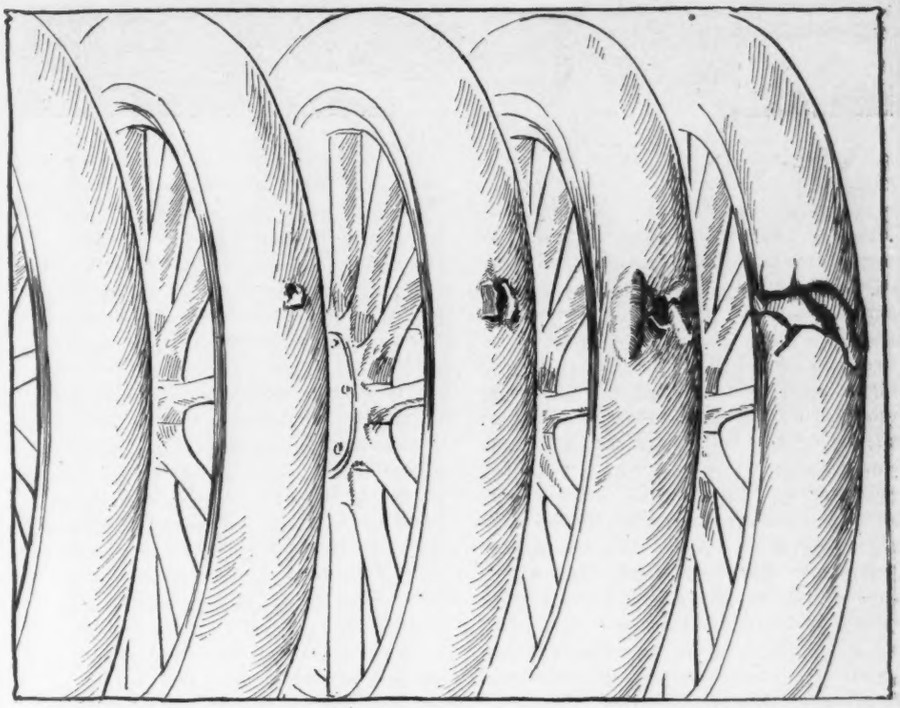


FIG. 4—THE FIVE STAGES IN TIRE CONDITION—1, PERFECT TREAD; 2—SMALL CUT; 3—HOLE ENLARGES; 4—RUBBER LEAVES FABRIC; 5—THE BLOW OUT

The conclusion from all this is that the tire, whose tread clings to the fabric, may be allowed to run until separation of the tread becomes extensive. One whose tread loosens, however tough and resistant its surface may be, must be watched carefully for local sand blisters, which may attain considerable proportions before the tread is worn through.

Treatment for Tread Cuts

The foregoing paragraphs have dealt with what may be called the ordinary run of cuts, and with punctures too small to require specific repairs except to the inner tube itself. Outside of these come the occasional large gashes which every tire suffers occasionally, and which call for immediate treatment if the fabric is not to be speedily ruined at that point. These gashes, together with all the minor cuts which reach the fabric when the tire is new or nearly so, are best handled at home with portable vulcanizers. To protect them, unless the car is run a great deal, is to shorten the life of the tire seriously. To repair them by taking off the tire and sending it to the vulcanizing shop is out of the question, both from the extreme inconvenience of doing this every little while and because curing the whole tire every time one or two local cuts need repairing infallibly means overcuring it and reducing its life. Because the common portable vulcanizer fills a place at home and in the garage which nothing else can fill, it is justly deemed a boon to the motoring public.

Although the portable vulcanizer, when properly applied, may save its first cost the first time it is used, its proper field is not always understood. As above intimated, a tread full of small cuts which reach the fabric is not a promising subject for local treatment, since even if one sand blister is vulcanized down, another is sure to come in the next 100 or 200 miles. The chief function of the vulcanizer, therefore, is to repair early deep cuts and extensive gashes. It also is essential for repairing inner tubes when damaged by blowouts or bad punctures, and for inserting sections, etc., in inner tubes. Obviously, even the smallest punctures can be repaired to advantage by the vulcanizer. The writer, however, has had no difficulty with the so-called acid-cure cements in connection with small repairs to the inner tube. It seems necessary to add, however, that the acid has been accused of damaging the fabric of the casing, though that never has happened in the writer's personal experience.

Besides this class of repairs, local inside reinforcements can be applied to the fabric by the use of an inside vulcanizer in connection with the customary outside type. These inside vulcanizers, though they have not thus far been adopted extensively in private garages, are very valuable when the owner or his chauffeur has some little mechanical skill, since they permit extensive and lasting repairs to be made which would be quite costly if done in a regular shop.

Using the Vulcanizer

Like any other appliance, the vulcanizer, Fig. 3, demands some know-how to yield the best results. When current is available the electric type of vulcanizer is very successful, as it is easily and accurately regu-

lated. If direct current is used, the heat is controlled by rheostat. Alternating current vulcanizers, however, are regulated either by a rheostat or by a thermostat incorporated into the vulcanizer itself, and adjustable by a contact screw to the temperature desired. The precise temperature at which crude rubber vulcanizes is between 250 and 275 degrees Fahrenheit. A higher temperature damages, a lower one produces no effect, therefore exact regulation is of the first importance. To vulcanize, rubber must be mixed with sulphur and other chemicals. Crude rubber and rubber cement furnished for vulcanizing purposes are already thus mixed, and require no treatment except heat. The time during which heat must be applied varies from 15 minutes for a thin inner tube to an hour or so for a repair to the tread. The longer time is required mainly to allow the heat to penetrate. Since the vulcanizer's temperature is automatically limited, it follows that the first result of its application to the tire is a drop in temperature, which must be made up before actual curing can begin. Another point with thermostat regulation is that when the current is first started the temperature will run above normal, as indicated by a thermometer in the vulcanizer, and then will drop to normal. The vulcanizer must not be applied to the work until normal temperature has been reached. To hasten matters, the vulcanizer may be covered loosely with burlap or the like, while it is warming up, but this, if done at all, should be done very cautiously, since the vulcanizer may get too hot if unwatched, and break the thermometer, owing to the thermostat responding slowly.

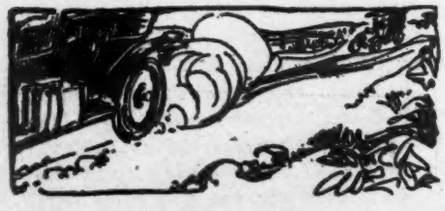
Instructions for Vulcanizing

Apart from the management of the vulcanizer itself, the preparation of the repair job requires a certain amount of experience, for which reason the novice is advised to begin with simple jobs, such as repairing inner tube punctures and small cuts in the tread. The instructions for cleaning and roughening the rubber surfaces are the same as for repairing with the ordinary patches. If the puncture is small a round patch of crude rubber is cut ½ inch all around larger than the puncture and is laid over the hole. A second patch is cut ½ inch larger all around than the first, and is laid over it. A sheet of common waxed paper, such as is used to protect butter, is laid over the patch, and the tube is clamped between the vulcanizer and the shelf. In 15 minutes to ½ hour the job should be finished. If the patch still looks brown, not gray, leave the vulcanizer on a little longer. For a large puncture or a blowout, the instructions are about the same, except that waxed paper should be slipped inside the tube to prevent the patch from sticking to the other side. It is a good idea to cut a narrow strip of crude rubber the width of the tube thickness and lay it between the edges of the tear to unite them more firmly. If there is time, let the vulcanizer cool somewhat on the patch.

By the use of a little ingenuity even fairly large work may be handled in sections. For example, a bad section can be cut out of an inner tube and a new section vulcanized in. This is done by applying the vulcanizer in three positions, so as to extend the cure around the circumference of the tube.

The greatest usefulness of the portable vulcanizer in connection with casing repairs is to close up cuts and gashes which reach but do not penetrate through the tread. If the fabric is not seriously cut, and if the tread has not separated from the fabric around the cut, it is necessary only to clean the cut thoroughly with gasoline, apply cement and let it dry in the usual manner, and fill the cut with raw rubber in strips cut to shape. These strips should not project above the surface of the surrounding tread, as the rubber swells slightly on vulcanizing.

If the tread has separated—for example,



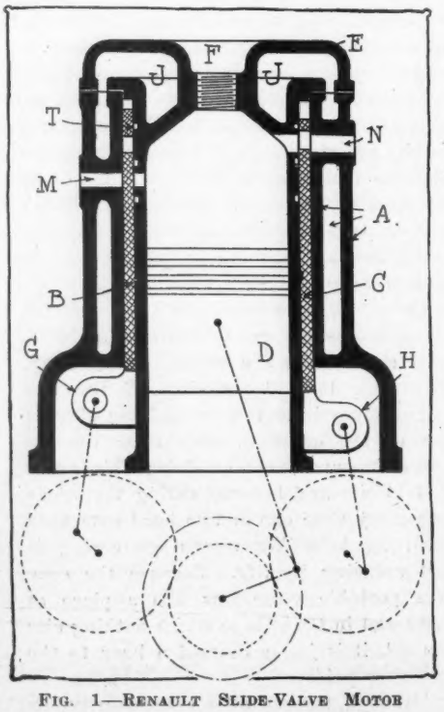


FIG. 1—RENAULT SLIDE-VALVE MOTOR

Some of Latest Ideas

if a sand blister has begun to form—a surgical operation must be performed to get out the dirt. The loose portion of the tread is slashed open to expose the entire loosened inner surface. The dirt then is thoroughly cleaned out with gasoline and a brush, the surfaces are cemented and allowed to dry, and a strip or sheet of crude rubber is laid between the fabric and the loose flaps of the tread. The edges of the cuts must be cleaned, roughened, cemented and joined by means of strips of crude rubber laid between. To let the vulcanizer cover the surface, the tire is partially deflated.

Stopping Puncture Extending

In case of a cut or puncture extending through the fabric a canvas patch must be put inside to prevent the inner tube from blowing through. This patch is best applied with the aid of the inside vulcanizer, both the inner and outer repairs being carried on simultaneously. If the hole is not too large, however, it is possible to use the acid cure process. The patch should be large enough to give a good grip all around the hole, and also thick enough to stand the air pressure. If necessary, two or three layers of canvas of graduated sizes may be applied, the largest piece first. If the fabric is cut so badly as to weaken it, the casing should be sent to a repairer, who will probably cut away a portion of the fabric around the hole and vulcanize in a new piece.

Fixing Minor Repairs

The best way to attend to minor tire repairs in practice is to jack up the wheels and examine them at intervals, depending on the character of the roads and conditions of use. When cuts are found they can most conveniently be repaired at the same time that other work is done on the car. A certain time must be allowed for drying the cement, warming up the vulcanizer, and for the actual vulcanizing; and usually other work, such as oiling, cleaning and adjusting, can be done at that time, since the vulcanizer does not need to be watched after it has come to its working temperature. It is not necessary to remove the tire from the wheel in order to vulcanize cuts in the tread, unless those cuts penetrate right through the fabric, in which case, as above noted, a canvas patch should be put inside. If proper use was made of talcum powder when inserting the inner tube, and if the temperature is correct, the inner tube and the casing will not stick together, nor will the inner tube be injured in the process.

In European Practice

WHETHER the slide valve will replace the poppet valve is still a doubtful point; but it cannot be denied that European constructors are inquiring very seriously into the possibilities of the slide-valve motor and that the patent office is being kept busy. Louis Renault, the head of the Renault company, after inventing a rotary-valve motor which never was produced, has just taken out patents for a new type of slide-valve motor. Fig. 1 shows a vertical section of the motor. A is a casting comprising the outer wall of the waterjacket, the water circulating space and the interior wall. B and C are the two slide valves in contact, respectively, with the cylinder walls proper D and the inner wall of the waterjacket. In the example shown an independent head, E, is employed, with ample waterjacketing shown at J and provision for the spark plug at F. The two sleeves, B and C, each carries a lug, G and H, at their bases and are operated off the mainshaft either by cams or eccentrics. The intake and exhaust ports are shown at M and N, and are put into communication with the interior of the cylinder by means of suitable openings in the sleeves.

As can be seen from Fig. 3, the sleeves each occupies about one-third of the circumference of the cylinder, the space between them being shown by the fixed portion R and S. The circumference, however, may be varied, according to the size of the valve ports it is desired to employ, each of the sleeves being equal to half the circumference if desired. It will be noticed, too, that the parts are not on the same level. This method of construction would be preferable where interior compression rings are carried, as at T. Where compression rings are employed it would be advantageous to cut the openings in the sleeve, as shown in Fig 3, bottom, thus facilitating the passage over the compression ring. The openings in the sleeve may be abolished by decreasing the height of the sleeves, so it is the upper portion of these latter which covers or uncovers the intake and exhaust ports.

New Engine Spring Suspension

The somewhat ingenious springing system fitted on the New Engine chassis made by an English company in Fig. 2 has some considerations of interest embodied in its design. It will be clear on reference to the figure that the fixed end of the spring is secured in a solidly constructed bracket attached to the frame; its other end rides in a slotted casting secured to the rear axle. The spring is in no way fixed to this bracket, so that there can be no longitudinal strain upon the spring. The axle is secured to the frame solely by radius rods, one of which is illustrated. The arrangement is simple and the designers claim the following advantages: That extreme flexibility is obtained from a short spring. That the point of suspension is high in relation to the center of gravity of the car so that rolling when rounding corners is to a great extent eliminated. That all longitudinal strain is taken by the radius rods and that though these are stiff in a vertical direction are somewhat light otherwise, so that in the event of collision, by doubling up, the radius rods relieve the frame, etc., of the greater part of the shock. These rods can be easily straightened so that damage is reduced to a minimum. That in the unlikely event of spring breakage, as the latter will only sag onto the radius rods, the car still remains in a condition to be driven.

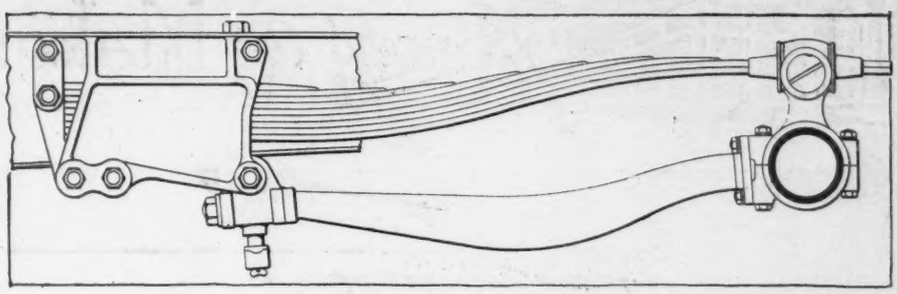


FIG. 2—NEW ENGINE SPRING SUSPENSION

Vauxhall Speed Cars

Reference should be made to the products of the Vauxhall company on account of the astounding results which have been obtained on the Brooklands track with the 20-horsepower Vauxhall, 90 m/m bore by 120 stroke (3.54 by 4.72). A speed of 100.08 miles per hour has just been accomplished by this car for the flying half mile, and a speed of 93.31 miles per hour for the flying lap, 2.76 miles. The car has no extraordinary features, the cylinders are cast in one block, and carburation is obtained with the White & Poppe carbureter. Four speeds are provided. The crankshaft is fitted with five bearings, and there is a main oil pipe with five branch pipes, one for each of the bearings, the crankshaft of course being drilled for the connecting rod ends. In the 2,000-mile trials of the Royal Automobile Club in 1908 the winning Vauxhall car used rather less than 1 gallon of oil per 1,000 miles. The exceptional performance of this car would appear to be due to the use of rather larger valves than ordinary and to the excellence of the workmanship. The various parts are made of the following materials:

Name of Part, Material.	Ultimate stress Tons per Sq. In.	Elastic limit Tons per Sq. In.	Elongation on 2"
Crankshaft, nickel chrome steel	50	40	20%
Gear shafts, propeller shaft and axles, nickel steel	40	22	30%
Gear wheels, nickel chrome steel	108	102	15%
Front axles, mild steel	28	14	25%
Stub axles, mild steel	28	19	55%
Crank case and gear box, 90% aluminum	13	..	5%
Levers, mild steel	28	14	25%
Hubs and brake drums, mild steel	28	19	55%

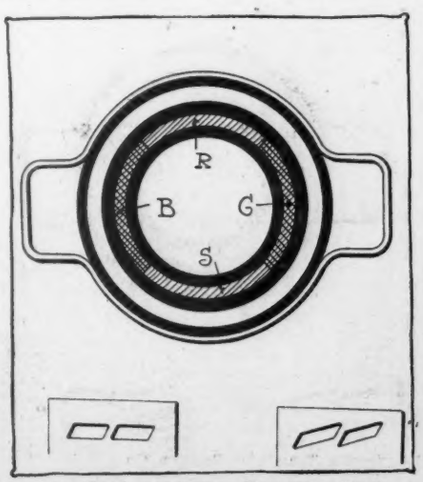


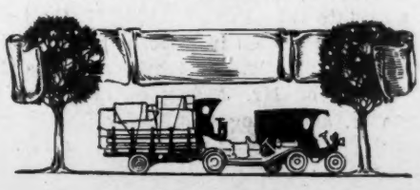
FIG. 3—LANCHESTER SELECTOR GEAR

PITTSBURG SECURES A HALL

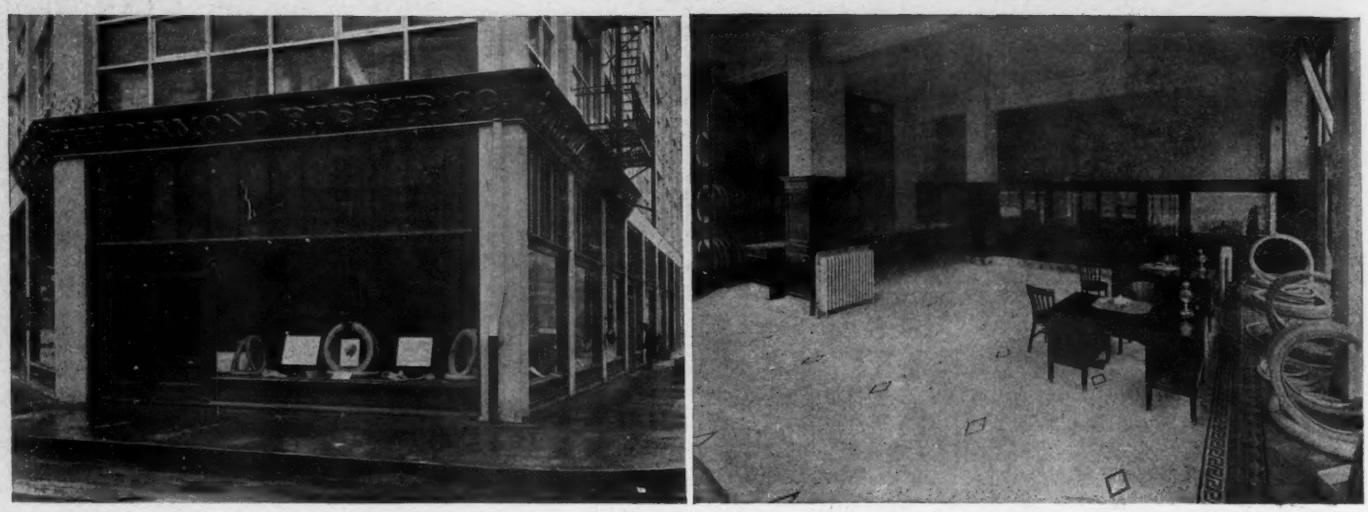
Pittsburg, Pa., Dec. 24—The Pittsburg Automobile Show Association has finally secured Exposition hall for its first show, which will be held March 18 to March 25. Space has already been signed for forty-two makes of cars. Five new members have joined this association during the past week, the Velie Motor Vehicle Co. of Moline, Ill., the Alco Pittsburg sales branch, the Packers Truck Co. of Pittsburg, the Penn Motor Car Co. and the Pittsburg Motor Car Co. Thomas I. Cochran is manager for this event and has opened offices at 1001 Union Bank building.

BUFFALO PLANS MATURING

Buffalo, N. Y., Dec. 24—Preparations are in full blast for the ninth annual Buffalo show, which is to be held at the Broadway arsenal during the week of February 6-12, by the Automobile Trade Association of Buffalo. Although the hall is a capacious one, it appears from the present number of inquiries for exhibitors' space that it is going to be a very difficult matter to take care of everyone desiring to be represented.



Among the Makers and Dealers



EXTERIOR AND INTERIOR OF DIAMOND COMPANY'S NEW BRANCH IN PORTLAND, ORE.

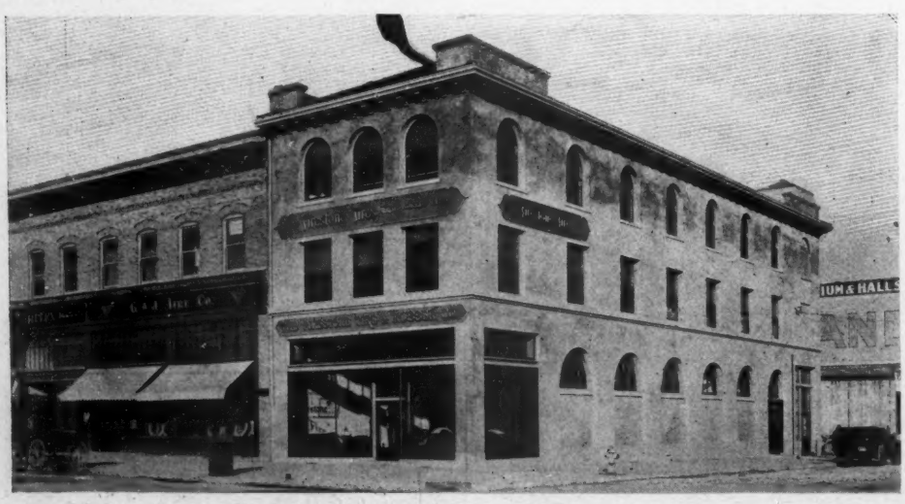
CORDNER in New York—E. Q. Cordner, formerly Studebaker manager in Chicago, now is identified in a sales capacity with the General Vehicle Co. of New York.

Car Plant in Baltimore—Charles J. F. Steiner has received permission to begin the erection of a motor car factory at Monument and Eleventh streets, Baltimore. According to the plans, the building will be of brick and concrete with a slag roof. It will front 80 feet on Monument street and will have a depth of 160 feet.

Rutenber Will Move—The Western Motor Co., manufacturer of Rutenber motors, will have its general offices and sales department transferred from Logansport, Ind., to Marion, Ind., where a new modern, fireproof factory and office building has been erected fully equipped to handle the building of all of the Rutenber models. The 1911 output will be approximately 10,000 motors. New models of four and six-cylinder motors for heavy-duty work are being built and will be brought out in the early part of next year.

Matheson Reorganization—The Matheson Automobile Co.'s executive staff now consists of William C. Shepherd, president; C. W. Matheson, general sales and advertising manager, and Frank Matheson, secretary.

Organizing in Southwest—The Kansas City Automobile Dealers' Association is engaged in an enterprise which has taken the form of the Southwestern Automobile Dealers' Association. About 6,000 letters have been sent out, and a meeting has been arranged to take place in Kansas City during the show the week of February 27. Fifteen hundred of these letters that have been sent out have gone to dealers and several hundred replies have been received, which goes to prove the timeliness of this movement. It has been suggested that the organization affiliate in some way with the implement dealers' association. The Kansas City Motor Trade Association has issued a call for a similar meeting to be held during the week of February 13-20.



SAN FRANCISCO BRANCH OF THE FIRESTONE TIRE AND RUBBER CO.

Sprinkler in Streator Plant — The Streator Motor Car Co. has completed the installation of a sprinkling system in its plant. This system will sprinkle and make absolutely fireproof its 5½ acres of buildings. The buildings are fireproof, but this additional protection has been taken on account of the stock.

Atwater Kent Starts Suit—The Atwater Kent Mfg. Works, of Philadelphia, has recently commenced suit in the United States circuit court for the eastern district of Pennsylvania against Jacob Lundgren, of Philadelphia, for infringement of its letters patent No. 775,665, issued November 22, 1904, to the Varley Duplex Magnet Co., relative to ignition apparatus.

New Firestone Building—The San Francisco branch of the Firestone Tire and Rubber Co. has moved into its new building at the corner of Van Ness avenue and Fulton street. It is a three-story structure, built exclusively for the Firestone company. In common with most of the other Firestone service branches throughout the country, this store has a connection at the curb for furnishing free air pressure.

T. B. Jeffery Left $3,731,306—The inventory of the estate of Thomas B. Jeffery, of Kenosha, Wis., late president and founder of the big Rambler works, shows an estate valued at $3,731,306.77, the largest ever probated in Kenosha county. The largest single item in the inventory is the interest of Mr. Jeffery in the Rambler works, amounting to $2,007,346. The remainder consists of personal property and

NEW BRANCH OF FORD MOTOR CO. IN OMAHA

real estate in Kenosha and other counties and interests in a number of the largest industries of America.

Cadillac in Peoria—The Cadillac Automobile Co., of Peoria, Ill., is located at 2008-10 Main street in a 40 by 70 building, two stories high. The show room and office occupy the ground floor, and workshop and store room for cars the second. The company controls ten counties in central Illinois.

Again the Second-Hand Car—The Boston Automobile Dealers' Association is going to tackle the problem of second-hand cars just as soon as the New York shows are over and arrange some basis whereby a dealer will know just what to do when a man makes the rounds asking bids for his used machine. There is no regular stated rate, and it is thought some dealers have been allowing too much and thereby hurting the whole trade.

Will Do Autogenous Welding—The Autogenous Welding Equipment Co. has opened plants for the repair of broken parts of all descriptions at 62½ Church street, Hartford, Conn., and at Southampton street, junction with Massachusetts avenue, Boston, Mass. The three plants are to be operated under uniform conditions, all bills will be rendered from the home office at Springfield, there will be a uniform system of charging and a uniform guarantee on the work.

Case Boiler Shops—The addition to the boiler shops of the J. I. Case Threshing Machine Co., Racine, Wis., is being completed. This is a building 60 feet by 215 feet, which will be used exclusively for a stock room for the Case boiler shops. A boiler storage has been completed, 230 feet by 60 feet. This is equipped with a traveling train for movement of boilers from one part of the building to another. Under the supervision of the Case architect the work has been undertaken and completed; also the remodeling of the Garfield warehouse, which is 100 feet by 250 feet and two stories high. This building, when the remodeling is completed, will be used as a machine shop. Machine shop facilities have not been adequate.

Covert Enlarges Plant—The Covert Motor Vehicle Co., of Lockport, N. Y., has enlarged its plant and installed modern machinery so the capacity has been increased to 100 complete transmissions per day.

Vancouver Lists Show—Vancouver, B. C., is to come to the front with a show, to be held in the big horse show building for 8 days, from Friday, January 27, to Saturday, February 4. This will be the first motor show ever held in British Columbia. During 1910 the sale of cars in Vancouver and British Columbia increased 120 per cent over the previous year.

New Ford Branch Completed—The Ford Motor Co.'s new branch building at Twentieth and Harney streets, Omaha, has just been completed, and the Omaha representatives have moved in their stock. The building was designed by Kahn, of Detroit, and cost the Ford company $40,000. It is of brick, concrete and tile construction throughout, two stories and basement, and 60 by 132 feet. The showroom is finished in oiled oak. In keeping with Kahn's ideas, the building is a mass of windows.

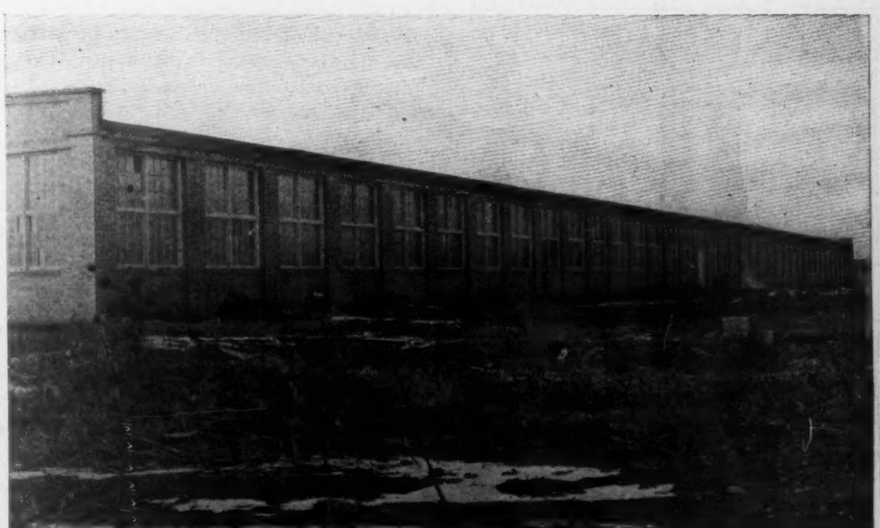
Death of Rambler Agent—George A. Wotten, one of the most popular automobile men on the coast, and for the last 3 years northwest distributor for the Rambler cars, with headquarters at Tacoma, Wash., died with pneumonia during the past week.

Wrong Caption—The illustration published on page 35 in the December 15 issue of Motor Age and captioned as a Beaver ball-bearing motor, was not the product of that concern, but the engine made by the Davis Mfg. Co., of Milwaukee. Motor Age hastens to correct the unintentional error.

Wetzel Will Sell Lamps—Thomas J. Wetzel, of the Thomas J. Wetzel Co., 17 West Forty-second street, New York city, will sell the output of the C. M. Hall Lamp Co. for 1911. Mr. Wetzel is vice-president and the largest stockholder in the Hall company. Denial is made that the Hall company will be reorganized as published some time ago.

New Diamond Branch—The Diamond Rubber Co.'s new branch in Portland, Ore., is regarded as one of the finest tire stores in the United States. The main floor is tiling, office floors cork tiling, the fixtures and furnishings are complete in mahogany, with bevel plate glass; the basement, for the storage of tires, is complete and is fitted with solid rubber machines for applying both side-wire and internal wire types of solid rubber.

Open Branch in Detroit—Byrne, Kingston & Co. and the Kokomo Electric Co., Kokomo, Ind., have opened a branch at 475 Woodward avenue, Detroit, with Forrest J. Alvin as manager. They are represented in New York by W. E. Kemp, with headquarters at 1650 Broadway, and in Boston by Smalley Daniels in the motor mart. Arrangements are also being made to open a branch in San Francisco, which will be announced at an early date.



NEW MACHINE SHOP OF STREATOR MOTOR CAR CO.

Current Motor Car Patents

IMPROVED Spark-plug Design—No. 978,494, dated December 13; to James L. Seeley, Los Angeles, Cal.—This patent relates to a spark plug design that should render the insulation impervious to the effects of heat, and thereby the operation of the plug should not be impaired by a crack in the insulation. The plug, Fig. 2, is conventional in design, except that the insulated electrode T is surrounded for the greater part of its length by an air gap formed by the hollow construction of the insulating member M. The collar C, which supports the lower end of the electrode T, closes the lower end of the hollow insulating member. The interior chamber thus formed is of such length that an air gap is present throughout that portion of the length of the spark plug where no external air gap surrounds the insulating member. The insulating member M has an annular flange F, by which it is secured in the shell of the plug, and it tapers away from the shell above and below this flange so as to be unaffected by expansions caused by high temperatures, and more readily cooled.

Engine Starting Device—No. 978,264, dated December 13; to Peter P. Au Buchon, French Village, Mo.—This patent covers an engine-starting mechanism arranged beneath the body of the vehicle, as shown in Fig. 3, by means of which the crankshaft of the motor may be revolved from the driver's seat through a long hand lever L. The mechanism comprises a shaft T mounted transversely with respect to the engine shaft, ratchet wheels W secured thereon between the arms of the yoke members M. The yoke members are loosely mounted upon the shaft, and each member carries a gravity pawl which is adapted to engage with the teeth of the ratchet wheels

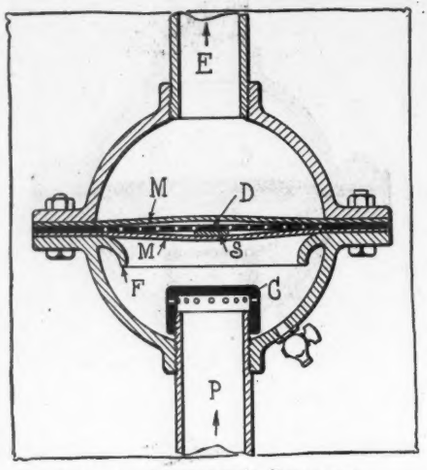


FIG. 1—CARPENTER'S SEPARATOR

to lock the yoke members to the shaft. Reciprocating arms A, pivotally connected to these members M, communicate between them and the arms B mounted on a second transverse shaft S. The operating lever L is secured to one end of this shaft, and when it is operated the arms are reciprocated in opposite directions, alternately connecting the yoke members with the ratchet wheels so that the transverse shaft T is constantly rotated in one direction. A bevel gear on the transverse shaft operates a pinion N on the engine shaft, and manually operated gearing is provided to bring the pinion in and out of mesh with the bevel gear.

Easily Removable Spark Plug—No. 978,280, dated December 13; to Wray Falwell, Boston, Mass.—The spark plug to which this patent relates resembles somewhat the well-known breech-block plug now in extensive use. It differs, however, in that both the electrodes are removable intact, so that adjustment of the sparking points is facilitated without the use of a wrench, or removal of the shell of the plug from the cylinder. This plug also serves as a priming cock. The design is illustrated in Fig. 4, the comprises the metallic shell S, a metallic shell electrode E filled with insulating material, an insulated electrode I, and an internally threaded head D with a handle H to it, which, when loosened, permits of the removal of the two combined electrodes E and I.

Gas Purifier and Economizer, No. 974,551, dated November 1; to John W. Carpenter, Salem, W. Va.—This patent covers a device for separating water, solid particles and the like from liquid fuel before it is admitted to the carbureter. It consists of a casing as shown in Fig. 1, comprising two hemispherical sections provided with peripherial flanges. A perforated metal disk D is secured between these flanges, with a resilient filtering membrane M on each side of it, which are also secured between the abutting flanges of the two hemispherical sections. A spacing member S is provided between one of the membranes and the perforated disk. There is an inlet pipe P in one of the hemispherical sections having a metal cap C screwed to its inner end, which is provided with perforations in its side; this hemispherical section also is provided with an inwardly curved flange F. A petcock is secured in one section near the inlet pipe for draining water and impurities therefrom. The purified fuel makes its exit through the pipe E.

Has New Brake Idea—Joseph W. Huebner, of Milwaukee, a mechanic and electrician, has perfected a device for emergency braking of motor cars and street cars. The device works on the compressed air principle and is automatic in action. It is attached to the motor and operates on both front and rear wheels simultaneously. Patents have been applied for on the device.

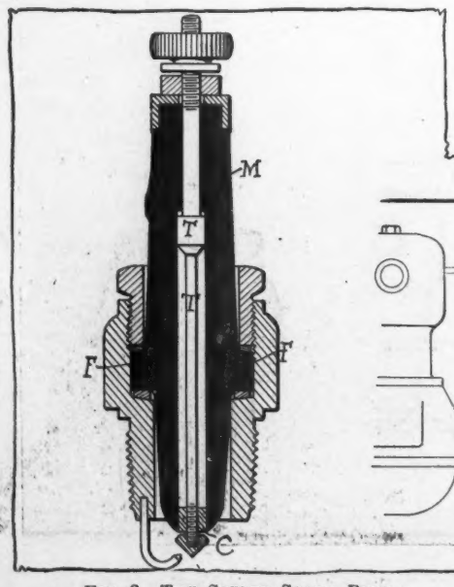


FIG. 2—THE SEELEY SPARK PLUG

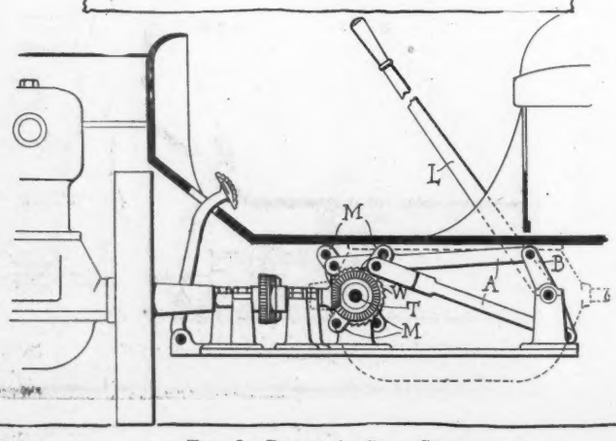


FIG. 3—BUCHON'S SELF STARTER

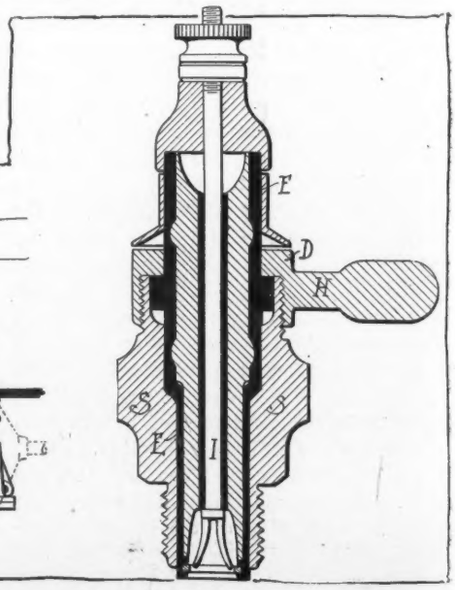


FIG. 4—THE FALWELL SPARK PLUG

The Motor Car Repair Shop

Hints for the Amateur

A MOTORIST once brought his car into the repair shop to have it tuned up. There was nothing radically wrong with it, except that the motor seemed to have lost power. The car was a new one, having been obtained from the factory but 2 months before, and it had been running beautifully until the last couple of days. The compression was tested by cranking the motor over slowly by hand and found to be but fairly good, the storage battery had been run down for several days and was now being recharged, but the engine had run just as well on the dry cells as on the storage battery. The repairman then cautioned the motorist in regard to the folly of allowing his storage battery to become so completely discharged, advised that the valves be ground in, that the lubricating oil in the circulating system of the motor be changed, and the dry cells replaced with a fresh set, which was his diagnosis of the trouble.

The car was then left with the repairman, with instructions to restore to the motor its power. The valves were ground in, the operation proving a simple one, as they had not been neglected to such an extent that they had become badly pitted. The lower portion of the engine case was removed and the black dirty oil and the sediment thoroughly cleaned out with gasoline; a squirt gun and gasoline was used to clean out the corners and parts that could not be reached with the brush; kerosene was employed in the squirt gun to cleanse the internal working parts in the upper portion of the case; and the bottom part then was replaced, and refilled with the required amount of a good grade of lubricating oil.

Ignition System Is Looked Over

The fresh set of dry cells was put in next; each connection was securely made and arranged so that there would be no danger of their coming in contact with one another or with the sides of the metal battery box; some old rubber matting that had been laying around the shop was cut to form a lining for the box, as an added precaution; the contact points of the coil were carefully examined, adjusted and cleaned; the wire connections of the coil were also examined and the loose ones tightened; the spark plugs were removed, cleaned, and points adjusted where adjustment was required; the high-tension cables from the coils to the plugs were inspected, to insure that they were not laying on some metal portion of the engine, where damage to the insulation might occur; and the low-tension wiring was carefully gone over in a similar manner, timer and coil connections tested. The timer cover was removed and the internal parts cleaned up, and tape wrapped around portions of the insulation that were apt to be damaged by contact with rough surfaces on the car.

A general cleaning up of the outside fittings of the motor was the next operation, and at the same time, as each part was freed from its accumulations of dust, grease, or dirt, a watchful eye was on the lookout for loose nuts, lost grease cups, and the like.

A General Oiling and Inspection

With a hand oil can in one hand and a drop light in the other, a short general inspection followed. All grease cups were examined, refilled if necessary, or screwed down a turn or two; a few drops of oil was placed on all pushrods, a drop on all carbureter and ignition control mechanisms; the fan was oiled, the belt adjusted, and all water and gasoline or gas connections subjected to close and careful scrutiny, so that timely attention could be given to any leaks present or probable. When satisfied that nothing had been overlooked, the motor was started and allowed to run for half an hour; the first 5 minutes of its operation being watched, and the radiator examined to see that it was free from leaks and properly supplied with the cooling medium. At the end of this time, the engine was pretty well warmed up and the expansion in the valve stems had taken place; so the motor was stopped and the space between the valve-stems and push-rods adjusted, the space allowed between each being equal to about the thickness of an ordinary business card, which is equivalent to .009 inch.

This completed operations on the motor; but still the job was not finished. It was still necessary to investigate conditions between the motor and the rear wheels, it being still possible that the loss of power might have been due in part to dragging brakes, a tight bearing in the transmission system, misalignment of some part that would make for hard running, or perhaps a choked muffler. To test the condition of the transmission system one of the rear wheels was jacked up from the floor, the gears of one of the speeds of the gearset thrown into mesh, the brakes released, and the motor cranked with the ignition shut off. Each speed of the gearset was tested in this way, notwithstanding the fact that a test of the high speed alone would have been a fair guarantee that all was well, as far as the speed, the driving and differential gears and one wheel was concerned. The jack then was removed, and the other wheel raised and tested on the high speed. Had cranking of the motor been exceptionally hard under any of the above conditions it would have been indicative of the presence of one of the above-mentioned troubles. As for the trouble being due to clogging of the muffler, it was quite unreasonable to believe this the cause of the trouble on so new a car. A short ride with the driver of the car when he called for it proved this to be true, and the power had been fully restored, to his delight.

To test for a clogged muffler on a car, one has but to get upon an even road, set the motor control levers so that the car will travel at a certain medium rate of speed, note the speed as indicated by the speedometer, then open the cutout and see if there is any marked increase in the speed of the car. If the car has no cutout, either the muffler must be removed, or a section of the exhaust pipe. Should the section of the exhaust pipe attached to the cylinders be the portion removed, the hood should not be put into place, but the test made without it, otherwise it may be badly burned, or at least the paint on it damaged. Should the car have a cutout but no speedometer, the judgment of the driver will have to be relied upon.

In Case Muffler Requires Cleaning

There are several ways in which a muffler may be cleaned out. A temporary method, popular with some drivers, is to race the motor with the cutout closed, shut off the ignition for a few seconds, then switch it on again. This allows a number of charges of unburnt gas to accumulate in the muffler which, when ignited by the following ignited charge, explode in the muffler and force out or loosen up the carbon deposits. There are cases on record, however, where mufflers have been broken by such explosions. A more thorough and effective method is to remove the muffler from the car, disassemble it, put the plates in the flame of a brazing outfit or a forge, heat them to a red heat, and the carbon deposits will drop off, or at least come off very readily if the plates, when cold, having been allowed to cool slowly in air, are struck sharply a few times and then washed in gasoline.

Brief Business Announcements

CLEVELAND, O.—The Auto Shop Co. has moved into a new fireproof building on Vincent avenue.

Clarkston, Wash.—F. H. Horton has secured the agency for the Maytag car in this territory.

Salt Lake City, Utah—The Randall-Dodd Motor Co. is now under the management of H. E. Dove, formerly of the Buick factory.

Waukesha, Wis.—The Nyberg-Waukesha Automobile Co. has been organized and will open a garage and salesroom on Broadway in this city.

Salt Lake City, Utah—Under the management of K. K. Kantzer, the B. F. Goodrich Co. has placed a branch house in Salt Lake City, at 123 East Second South street.

Milwaukee, Wis.—The Cream City Auto Co. has been incorporated with a capital stock of $5,000. The incorporators are H. E. Rogers, Carl Staum and W. J. Surres.

Cincinnati, O.—G. W. Boudinot, formerly with the Rapid Motor Vehicle Co., of Pontiac, Mich., is now connected with the sales department of the United States Motor Truck Co.

Portland, Ore.—A new agency for the Elmore car has been opened in Portland at Seventh and Ankeny streets with W. S. Dulmage and D. M. Smith, both former Studebaker men, in charge.

St. Louis, Mo.—Milton B. Strauss, formerly sales manager of the Parry Automobile Co., Indianapolis, Ind., has accepted a similar position with the Moon Motor Car Co., of St. Louis, Mo., and already has entered upon his duties.

Portland, Ore.—Krit cars are at home at 243 Burnside street. The Krit and Cole agencies have just opened their new salesrooms there. J. L. Snead is in charge, assisted by Robert Austin and Harry Twitchell, of the Cole agency.

St. Louis, Mo.—The Brinkman Automobile Co., 2437 South King's Highway, has taken the agency for the Rayfield. F. J. Rayfield, brother of the manufacturer of the car, is associated with C. F. Brinkman in the Brinkman Automobile Co.

Decatur, Ill.—The fireproof garage at the corner of Washington and South Main street is open to the public. The building is 65 by 150 feet and is constructed of brick, steel and concrete. It has its own lighting and power plant and also a compressed air and vacuum system installed. There are women's waiting, dressing and toilet rooms, with the same accommodations for men, and on the second floor are shower baths for employes. Steel lockers of ample size are in use for patrons of the garage. L. C. Shellabarger has erected this building at a cost of approximately $30,000.

Milwaukee, Wis.—The Milwaukee Motor Co. has increased its capital stock from $50,000 to $250,000.

Cleveland, O.—William Ordon has been appointed agent for northern Ohio for the Auburn. His headquarters will be at the Lorain Clark garage.

Cincinnati, O.—The Atlas Auto and Supply Co. has been incorporated with a capital of $10,000 to deal in cars and accessories by W. H. Welland and others.

Portland, Ore.—The Mitchell-Lewis & Staver Co. has taken the agency for the Metz. This car, with the Monitor commercial truck, comprises the line for this company this year.

Chicago—John S. Gorham, who for the past 3 years has held the position of electric vehicle specialist with C. P. Kimball & Co., has resigned to accept a position with the Superior Sales Co., of Peoria, Ill.

Boston, Mass.—F. Kemball, who has had charge of the Boston branch of the Vacuum Oil Co. for some time, has been advanced to a position in the New York house and H. M. Hobson succeeds him at Boston.

Rockford, Ill.—Eric J. Gustafson, who has conducted a garage and repair shop here for the past 2 years, is now located in his new building, 60 by 150 feet, located at 116-118 North Court street, where he has a garage and repair shop.

Uniontown, Pa.—The Keystone Automobile Co. has opened its new garage on West Main street, under the management of Fred Close. The company has the agency for the Peerless, Chalmers, Pierce-Arrow and E-M-F cars in western Pennsylvania.

Columbus, O.—The Hudson Sales Co., located on North Fourth street, which has the agency for thirteen counties in central Ohio for the Hudson and fifty-six counties for the American, has signed up the following sub-agencies for the Hudson: The Gauther Automobile Co., Springfield; Stewart & Co., Mechanicsburg; Hornberger Automobile Co., Bellefontaine; Charles V. Stevens, Newark.

Dubuque, Ia.—The Dubuque garage, which has been operated as a garage and salesroom at Sixth and Iowa streets, this city, under the management of W. C. Riggitts, has just been incorporated as the Dubuque Auto and Garage Co., with an authorized capitalization of $20,000, $7,500 of which has been paid in. The new company is headed by F. G. Becker. B. J. Schwind is vice-president and George Eulberg secretary and treasurer. W. C. Riggetts will remain as manager. The company has just completed arrangements to handle the Overland line in Dubuque and Delaware counties.

St. Louis, Mo.—The Rex Automobile Co. has secured the agency for the Auburn car in the St. Louis territory.

St. Louis, Mo.—The Chicopee Motor Car Co. has been incorporated, to manufacture and deal in motor cars. The capital stock, fully paid, is $3,000.

Prairie du Chien, Wis.—Foss & Brunton are building a garage here. A livery and repair shop is included. The concern has not yet selected its agency contracts.

Milwaukee, Wis.—The Northwestern Oil Co. has been incorporated with a capital stock of $500,000. The incorporators are Charles A. Tekoorten, H. M. McKenzie and W. M. Powers.

Portland, Ore.—The Rapid Delivery and Express Co. has been organized in Portland to maintain a motor delivery service. Noyes E. Tyrell, E. H. King and R. H. Thompson are at the head of the company.

Boston, Mass.—The Regal company has closed its Boston branch and will market its cars here through an agency hereafter. It will have a New England headquarters in Boston, however, and L. J. Mutty will be in charge of it.

Seattle, Wash.—M. A. Miller, of the Northwest Auto Co., with headquarters in Portland, has established a distributing branch at 511-513 East Pike street, Seattle, which will handle the Reo and Apperson cars.

Philadelphia, Pa.—Temporary headquarters for the reception of applications for agencies have been established at 5109 North Eleventh street by Robert M. McCormick, eastern sales manager of the Maytag-Mason Motor Co., of Waterloo, Ia.

Philadelphia, Pa.—One of the largest and finest of garages in Philadelphia is shortly to be erected on the east side of North Broad street, between Pearl and Wood streets, for the Packard Automobile Co. The new structure will cost in the neighborhood of $300,000 and will have a frontage of 72 feet, extending in depth 170 feet.

Syracuse, N. Y.—Alvie G. Williams, of Central City Motor Car Co., will be occupying within a few weeks some of the most modern and up-to-date garages and show rooms in the Empire state. This building will serve as a home for the Haynes car, which Mr. Williams represents for this section. The building is located at the corner of Taylor and South Clinton streets. It will be constructed of concrete and steel and will be strictly fireproof throughout. It will have a frontage of 125 feet on Taylor street and

82 feet on South Clinton, while the show room proper, facing South Salina street, will be 37 by 36 feet.

St. Louis, Mo.—Milton Schelp, Jr., has been put in charge of the motor car department of the John Deere Plow Co.

Tacoma, Wash.—R. P. Le Feber has been appointed manager of the Tacoma branch of J. T. McKenna & Co., state agents for the Packard.

Pittsburg, Pa.—The West Penn Automobile Co. has been formed by John L. Prestley, George Henning and H. J. Nesbit to do a general motor car business.

Pittsburg, Pa.—J. W. Bayard is the factory representative of the Warren-Detroit for Pittsburg, western Pennsylvania and West Virginia. His headquarters are at 111 Beatty street.

Hartford, Conn.—The new branch of the Fisk Rubber Co., at 292 Asylum street, is open for business. G. H. Rockwell, of Chicopee Falls, is the manager of the new branch.

Chicago—The Badger Motor Car Co., of Columbus, Wis., has secured quarters at 1223 Michigan avenue for a general sales agency, and F. W. Stewart, sales manager, will be in charge.

Indianapolis, Md.—A factory sales branch has been established in North Capitol avenue by the National Motor Vehicle Co. B. M. Wylie has been appointed manager and will be assisted by John Aitken.

Salt Lake City, Utah—The United Motors has opened up its Salt Lake branch, with Maxwell and Columbia cars on the floor. The territory tributary to Salt Lake will consist of Idaho, Utah and western Wyoming.

Tacoma, Wash.—To provide room for its large stock of Chalmers, Overland and Thomas cars, the Pacific Car Co., of Tacoma, has remodeled the third floor of its garage. Frank Veazie has assumed charge of the taxicab department, while George A. Stewart has been made sales manager.

Syracuse, N. Y.—The Willis Motor Car Co. is now established in its new garage at 628 Montgomery street, the quarters being in a three-story brick building. Office and garage occupy the first floor, repair shop on the second and paint shop on the third. A. Rathbun has joined the force as office and garage manager.

Hartford, Conn.—Brown, Thomson & Co., distributers of the Lozier, Stevens-Duryea and Cadillac cars, have completed a three-story brick, steel and concrete service building. The floor space is 108 by 138 square feet. The new service building is located in the rear of the firm's big retail dry goods establishment on Temple street, there being two entrances from this thoroughfare. Brown, Thomson & Co. claim the distinction of being the only out and out dry goods house in the United States to make a success of the sale of motor cars. It was the first firm in the state to sell cars, starting with the Locomobile steamers, then came the air-cooled three-wheeled Knox. At one time the concern was agent for ten different makes of cars.

St. Louis, Mo.—The McCulley-Deane Co. has opened a store at 3919 Olive street with a line of specialties for electric cars.

Louisville, Ky.—The B. F. Goodrich Co. has opened a branch house in Louisville at 941 South Third avenue. The branch is in charge of C. A. Breyley.

Lima, O.—The Canadian Gramm Motor Truck Co., of Walkerville, Ontario, Canada, has been organized by officials of the Gramm Motor Truck Co., of Lima and Bowling Green, O., for the purpose of manufacturing and selling motor trucks to our northern neighbor. H. W. Acason has been elected president and general manager, F. H. Galusha vice-president and superintendent, and J. K. Webster secretary and treasurer.

Pittsburg, Pa.—The Cleveland Speed Indicator Co. has opened a branch office in Pittsburg at 806 Highland building, with E. T. Neal as manager.

Whitehall, Wis.—The Auto Sales Co. has been organized by R. S. Cowie, G. S. Rice, C. B. Melby, P. M. and W. L. Lambert. The corporation is capitalized at $8,000.

Columbus, O.—The Hudson Motor Sales Co., located at 241 North Fourth street, has taken the central Ohio agency for the American from the American Sales Co., which dissolves.

Indianapolis, Md.—The Oldsmobile Co., of Indiana, has been formed and has taken quarters at 325 North Pennsylvania street, with L. H. Conde as manager and C. R. Johnson as assistant manager.

Chillicothe, O.—The partnership heretofore existing between Roy M. Houck and James Gildow, under the name of the Houck-Gildow Motor Co., has been dissolved and the business will hereafter be conducted by Mr. Houck.

Columbus, O.—The Columbus Carbureter Co. has been incorporated with a capital of $10,000 to manufacture and sell a patented carbureter. The incorporators are John T. Adams, J. A. McDowell, D. H. Thomas, Thomas A. Swartz and Daisy Strader.

Napoleon, O.—The Ragan, Brown & Lange Co. has been incorporated with an authorized capital of $40,000, to manufacture motors and all kinds of vehicles, including motor cars. The incorporators are: James P. Ragan, Jacob F. Brown, Henry Lange, R. E. Ragan and K. N. Ragan.

Youngstown, O.—The Youngstown Automobile Co. has been organized by W. S. Westerbrook, John Gilpinger and others of that city. It will build a large garage in the rear of 511 Market street and will handle the Great Western, the American and Atterbury trucks.

Boston, Mass.—A. B. Henley has left the pleasure car field for the commercial business, taking a position as manager of the truck department of the D. P. Nichols Co., Boston agent for the Frayer-Miller. He was manager of the Franklin branch in Boston for 2 years.

Columbus, O.—The Broad Oak Automobile Co., located at 621 East Broad street, has leased the top floor of the building where it has been operated, giving an additional floor space of 87½ by 154 feet. The second floor will be fitted into a repair shop and show room.

Cincinnati, O.—The Motor Car Supply Co. has been incorporated with an authorized capital of $50,000 to operate a sales agency and to handle supplies of all kinds, by Andrew C. Gilligan, John J. Gilligan, Charles J. McDevitt, Charles F. Williams and Howard N. Ragland.

Recent Incorporations

New York—Safety Tire Co., capital stock $50,000; to manufacture tires for motor cars, bicycles, etc.; incorporators, R. H. Schenck, W. E. Holloway and O. R. Van Vechten.

Brooklyn, N. Y.—Sterling Place Garage and Sales Co., capital stock $10,000; to maintain a garage, etc.; incorporators, W. H. Perrine, R. D. Perrine and A. Stevane.

Paterson, N. J.—Fear-Naught Tire and Rubber Co., capital stock $125,000; to manufacture motor car tires; incorporators, E. J. Forham, G. F. Martin and H. P. Jones.

Philadelphia, Pa.—Kendal Motor Car Co., capital stock $500,000; to buy, sell and deal in motor cars and repairs for same.

Pittsburg, Pa.—Liberty Auto Tire and Supply Co., capital stock $10,000.

Waterloo, Ia.—Roy Cushman Co., capital stock $10,000; to buy, sell and exchange motor cars, motor machinery, supplies, etc.; incorporators, Roy Cushman and A. N. Cushman.

New Brunswick, N. J.—Endurance Tire and Rubber Co., capital stock $100,000; incorporators, C. E. Ecksode, G. E. Russell and Jabez H. Heim.

Boston, Mass.—Coburn Sales Co., capital stock $25,000; incorporators M. J. Coburn, J. L. Sacket and L. E. White.

Boston, Mass.—Globe Auto Top Mfg. Co., capital stock $5,000; incorporators, J. H. Goodman, J. R. Hughes and Samuel Goldstein.

Philadelphia, Pa.—Corapolis Garage Co., capital stock $6,000.

Philadelphia, Pa.—Ideal Motor Car Co., capital stock $5,000.

Philadelphia, Pa.—Marion Motor Co., capital stock $100,000.

Philadelphia, Pa.—Mackey Motor Co., capital stock $300,000; to manufacture motor cars, motor boats, engines, etc.; incorporators, J. C. Mackey, Wm. G. Jerolemon, R. M. Bateman.

Philadelphia, Ia.—Remington Tire and Rubber Co., capital stock $100,000; to manufacture rubber products; incorporators, H. G. Remington, D. J. Reynolds, C. S. Cairns.

New York—Peugeot Auto Import Co., capital stock $5,000; manufacture and deal in motor cars; incorporators, H. E. Taylor, G. C. Sniffen and A. G. Kauffmann.

Brooklyn, N. Y.—Clark-Norwalk Co., capital stock $3,000; to manufacture motors, engines, etc.; incorporators, H. Meinken, E. M. Schacht and J. G. Quinn, Jr.

Edgewater, N. J.—Marion Motor Co., capital stock $100,000; to manufacture motor cars, etc.; incorporators, E. J. Forhan, G. F. Martin and H. P. Jones.

Edgewater, N. J.—Whiting Motor Co., capital stock $12,000.

Detroit, Mich.—Thelma Motor Works, capital stock $10,000.

Boston, Mass.—Jamaica Plain Auto Station, Inc., capital stock $50,000; incorporators, J. D. Henderson and J. R. McPherson.

Washington, D. C.—Washington Motor Transfer Co., capital stock $25,000; incorporators, G. H. Beall, J. G. Hall and B. F. Anderson.

Philadelphia, Pa.—General Motor Car Co., capital stock $10,000.

Springfield, Ill.—Anderson Carriage Co., capital stock $1,200,000; to deal in motor cars and accessories.

Lansing, Mich.—Woodward Taxicab Co., capital stock $15,000.

The Realm of the Commercial Car

CAB DRIVERS FIGHT TAXIS

CAB drivers in Omaha, Neb., have declared war on the taxicab in one last effort to save the depot cab from utter annihilation. They started it recently by complaining to the police that the taxicab drivers who solicit business at the station frighten their horses. They wanted the police to rule out the taxicabs as unfair competition. The cabmen said that the taxicabs frightened the horses into a useless condition. The police investigated and, finding that all of the taxicabs are licensed as well as the horse cabs, they decided they could not interfere. The cabmen claim they have a prior right to the depot stand and will try to invoke the law, or a favorable city ordinance, against the taxicabs.

BUILDS A MOTOR PLOW

T. Scheil, of Spy Hill, Saskatchewan, Canada, has recently built a motor plow and successfully operates same on his large wheat farm at a speed of from ¾ to 1½ miles an hour. Mr. Scheil in building his odd machine first purchased a marine engine and fixed it up to do the work of a stationary engine. He chose a 10-horsepower Gray and mounted this on the base of an old steam traction engine, to which he attached three plows, each turning an average of about a 15-inch furrow; one 14-inch disk seed drill and two section-tooth harrows. With this contrivance he performs the complete operation of plowing, planting the seed and harrowing.

REPLACES SIX HORSES

No better demonstration of the efficiency and superiority of the motor-driven vehicle over the horse-drawn vehicle could be wished for than the exhibition given daily on the streets of Portland, Ore., by the Packard 3-ton motor truck now being used by the Banfield-Veysey Fuel Co., which hauls 6 tons several trips a day and makes excellent speed, too. The truck itself is piled high with wood in 4-foot lengths. Behind the main wagon is another wagon, or trailer, also loaded with about 3 tons of wood, altogether comprising a load of between 2½ and 3 cords of wood. The truck performs the work of six horses; does it cheaper, does it much faster and, moreover, reduces the cost of delivery.

SHOWS THE NEW KNOX

Manager A. P. Underhill, of the Boston branch of the Knox, gave Fire Commissioner Charles E. Daly, Chief Mullen and other officials of the Boston fire department the first look and demonstration during the week of the latest thing in motor fire apparatus, a combination engine and chemical turned out by the Knox company. It was the first one produced by the company, and it is claimed to be of original design. There is a regular motor to drive it to fires at a speed of 30 miles an hour. In addition to the regular apparatus there is another motor so arranged that hose may be coupled from either side to hydrants and then it will pump water at a rapid rate. In the test it threw a stream more than 200 feet and the fire officials were delighted with it.

TESTS SMALL TRUCK

To demonstrate the serviceability of a small truck, Brunn & Co., of Portland, Ore., owners of a Franklin 1-ton machine, recorded its performance during a record run of 1,304 miles. Eighty gallons of gasoline, or an average of 16.3 miles per gallon were consumed. This was during a term of 2 months and 6 days. The total running expense, exclusive of gasoline and oil, was $77.90. Following is the table:

Gasoline used, gallons	80
Distance covered, miles	1304
Oil used, quarts	9
Ave. miles per gal. gasoline	16.3
Ave. miles per gal. of oil	579.55
Speedometer	$30.00
Chamois and funnel	2.25
License	2.50
License	3.00
Storage	15.00
Insurance, 12.6c per day	8.45
Extra inner tube	16.70
Total	$77.90

PROVES ITS WORTH IN WAR

The use of motor cars for reconnoitering purposes in time of warfare is being successfully employed in Mexico by scouts of both the federal and revolutionary forces in the field in the region around Cerro Prieto, where the recent battle was fought. General Navarro, commander of the federals, keeps three motor cars in active service. For several days before the actual fighting opened scouting was done by means of these cars. There are some ranch roads in that part of the country, and for the most part they are unfenced. The land is level and hard until the foothills of the mountains are reached. These motor scouts are reported to have performed some remarkably good service by penetrating the very heart of the enemy's country, obtaining information as to the location and number of the different bodies of revolutionists, and then making a run for it while the bullets spattered around the machine.

General Navarro made several scouts of this kind in a motor car. It is related that on one occasion the machine in which he was riding was closely pursued for several miles by a car containing scouts belonging to the insurgents. While the two

machines were going at full speed the occupants kept up a constant exchange of shots.

In the early part of the campaign when a battle between the opposing forces seemed imminent near Chihuahua, a party of American non-combatants rode out from this city to take an inventory of the situation. They were going smoothly along the road when they were fired upon from behind a hill a short distance away. They hoisted white handkerchiefs, quickly turned the car around and sped back to town. The revolutionists had mistaken them for federals.

It is claimed by army officers in Mexico that the motor car is destined to take a admirably adapted for many purposes prominent place in future warfare. It is where the country is comparatively level. It is found to be much better fitted for scouting purposes than cavalry, it is claimed.

TRUCK PEACE IN BOSTON

The commercial situation in Boston has been straightened out in a manner that will eventually prove satisfactory to everyone, and another week will see the two motor truck associations recently formed dissolved practically and in their stead one large organization embracing all the men who handle the commercial cars. This was brought about by the men who saw the necessity for harmony. The Commercial Vehicle Association appointed a committee comprising L. B. Butler, Day Baker, S. P. Dennett and A. B. Cumnor. Then the Boston Motor Truck Association chose a committee comprising A. P. Underhill, J. H. MacAlman, A. B. Henley and C. F. Whitney, and these eight men had a conference over the situation. They talked over the matter of amalgamation very carefully and then reported back to their associations. The two organizations then empowered the committees to go ahead with negotiations, giving full power, with the result that the whole air has been cleared. Now an organization will be formed probably with new officers to hold office until about April.

There is some sentiment about holding a truck show in 1911, but it will not crystallize into anything definite. All the dealers will support the Boston show. The next one will be arranged so that the commercial end of it will be given greater prominence. In all the advertisements the commercial end of the shows will be brought out. A special door will be arranged for the truck employes and those wishing to see the commercial wagons, and in other ways this feature of the exhibition will be given more prominence than ever. Some time in the spring there will be a demonstrating tour to a number of the large cities.